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FIFTEENTH YEAR.

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CHARCOAL AS A FUEL.

Charcoal was the original fuel for melting iron, and year by year it is being resorted to on an increasingly extensive scale. No less than 18 per cent. of all the pig iron produced in this country is charcoal iron. Last year 638,838 net tons of pig iron, and 84,606 net tons of blooms and billets were made with this fuel, consuming about 1,000,000 net tons of it. A large amount of charcoal is used also in silver smelting works and various metallurgical industries, probably equaling the above quantity. Here we may remark that average wood is composed of 40 per cent. carbon, 20 per cent. water, and 20 per cent. of hydrogen and oxygen, the proportions slightly varying in different descriptions of woods. The carbonizations in driving off water oxygen and hydrogen, leave some 90 per cent. of carbon, and about 1 per cent. and 9 per cent. of water. In American practice kilns are rapidly superseding the wasteful method of making charcoal in heaps or meilers, whilst the acetic vapors arising from the carbonization are condensed and made into commercial products. In a lecture delivered by Mr. John Birkinbine at the Leadville meeting of mining engineers he observes: "The importance of carbonizing in closed vessels is not based alone on the value of acetic vapors collected, and the market for them may be a matter of secondary consideration. It is the possibility of obtaining a greater yield from a given amount of wood which makes retorts valuable to those using charcoal as a fuel for metallurgical processes. The reason for this is that the heat, being applied extraneously, none of the wood in the retort is consumed, while the kiln part of its contents are burned to carbonize the balance, and the meiler, being more open, less controllable and of smaller contents, wastes more food than the kiln. The saving of a large percentage of the wood required (particularly in some of the western States, where charcoal sells as high as 30 cents per bushel), will soon pay for a plant of retorts if the acetic vapors wasted are utilized. The first cost of a battery of retorts is large, but, based on the outlay per bushel of charcoal made, it compares favorably with the expense of kilns. When placed in nests, fuel for heating the retorts is seldom required, for the uncondensable gases resulting from the carbonization are generally sufficient to maintain the temperature of the retorts at the point desired. The amount of these gases available is insufficient in some parts of the process, and in others abundant, but where a number of retorts are operated together, the deficiency of one is made up by the other. The convenience of filling and emptying retorts, as compared with kilns, compensates for the cost of cutting the wood. It is to be regretted that so much waste occurs in the annual cutting in this country of upwards of 18,000,000,000 feet of boards. It is estimated that tops and branches left to rot in the clearings, and slabs burned by the mills are equal to 9,000,000 cords, which would provide 50,000,000 bushels of charcoal. It is not, however, in all locations where charcoal can be produced economically, regard being had to a market. We would remark in conclusion that there are so many commercial uses to which acetates and acetic acid can be applied, and such possibilities open to any process which cheapens them, that it is strange so little attention has been bestowed upon collecting the immense quantities now wasted in charcoal production, notwithstanding that large works have been erected at or in the vicinity of a number of cities solely for distilling these products from wood.

COPPER.

It can hardly be anticipated that copper will ever become as cheap as lead or iron, but consumers generally feel that the ore is mined on a scale and at a cost that would justify their obtaining it at lower prices. Our annual production is about 70,000,000 pounds, with a prospect of considerable increase, which will certainly be fully met by enlarged requirements. The actual consumption far exceeds the above amount, owing to old copper being worked up in new forms. The great hope of consumers in the future is the further development of the Western mines, more particularly those of Arizona on which vast capital is being expended with the certainty of large returns. The *N. Y. Mining Record* in treating of the Lake Superior copper monopoly says: "We fully admit the greatness and wealth of the Calumet and Hecla Mining Company, because of the almost inexhaustible reserves of fair ore, its magnificent plant, perfect organization, large cash surplus, shrewd management, and more satisfactory than all, handsome and regular dividends, but we shall venture the opinion that the copper deposits of Arizona, Colorado and New Mexico, will ultimately be turning out copper in quantities and at a price that will create wonder and astonishment." It is to be anticipated that Chili at no distant day will be in a position to send us something like the average quantity of copper dispatched by her previously to her war with Peru. The production of the European mines, the chief of which are those of the Rio Tinto, owned by English, French and German capitalists, is an important factor in the copper market, but the supplies from these are pretty uniform, and kept up to a point that keeps prices lower abroad than with us. At present ingot copper rules in London at 16 cents. The few copper refining works that until lately existed in this country have received important additions and the processes themselves have been improved upon. The copper ores which are refined in the United States are, for the most part, the native coppers of Lake Superior region. Until quite recently, but little pig iron copper was made for sale, and that came principally from the pure sulphurous ores of New England and the South, and was generally sold to refineries not far from the ore furnaces. A small amount found its way into the market which was produced either as the by-product of the treatment of gold and silver ores, or as the result of the treatment of impure copper ores; but both these grades, on account of the impurities they contained, were looked on with suspicion, and were not sought for. All the grades of pig-copper are sold by the unit of copper contents, a great reduction being made in the price when impurities are present. We may look for further improvements in refining. Successful experiments have recently been made in France by M. J. Garnier, at the works of Messrs. Laveissiere et Fils, Deville, near Rouen, with the purpose of removing arsenic and antimony in the commercial copper. From a theoretical standpoint the method now generally employed might be more satisfactory. The refining hearth is covered with silica, supposed to absorb the arsenic and antimony which are oxidized during the process, and to make them go into the slag. In reality this combination is formed very imperfectly, and as much as 2.1000ths of arsenic is considered sufficient to impair the quality of the copper. M. Garnier's process in some respects resembles the Thomas-Gilchrist process. He employs a sole of chalk and tar, over which, for each separate operation, he places a false sole of lime-stone and manganese peroxide. With the melting of the copper, a generation of carbonic acid and oxygen begins from the upper sole, which oxidizes the charge. As soon as the metal is sufficiently liquid, the lime and manganese protoxide rise and dissolve the arsenic acid. By this one operation the amount of arsenic, according to M. Garnier, is reduced to one fifth. As a special advantage of this system, M. Garnier claims that the roasting of the black copper becomes unnecessary, and that the loss of copper arising from parts of the copper combining with the silica of the slag is avoided.

ART IN AMERICAN INDUSTRIES.

We may learn from the examples of nations of antiquity how materially the application of the fine arts, including those of design, contributed to the wealth, power and influence of communities. The conditions of this country are especially favorable to the quickening of art into healthy growth. Art is a matter of national as well as individual concern, telling, as art does, on general manufacturing industry. Taste and artistic skill tell upon the productions of the machinist as well as on architecture, plastic industries, jewelery, etc., in which elegant designs and choice workmanship materially augment the value of articles. An artificer takes a lump of kaoline clay, the prime cost of which is too small to be conveniently expressible by any of our coins. He moulds it into a beautiful form, after it has been prepared for the potter's use by passing through the "slip-house;" it goes through the successive processes of throwing, pressing and casting; it undergoes its first firing; it is dipped and glazed; it is decorated by dexterous etchers and colorists; it is once more exposed to the action of fire in the "muffle" kiln, or the "glost" oven; and the perfected article brings a high price. As in ceramics, so in glass, in metal ware, in tissues, in cabinet work, and in numerous other branches of industry to which art ministers as a willing handmaid, enriching whatever she touches. In art furniture this country is steadily advancing. Cumbrousness has long been banished from our homes. Our furniture-makers prove themselves fully equal to the production of the stately and picturesque furniture of the Elizabethan period, in addition to original designs free from all incongruousness. This is shown, too, in choice of inland woods, with a view to harmonious effects. This country is rich in furniture woods, beautiful in grain and exceedingly diversified in color, ranging from the palest maple to the deepest and most lustrous hues. East Liverpool and Trenton show what can be accomplished in truly artistic ceramic ware. Only lately we had occasion to refer at length to the marvelous productions in design and color of Morley & Co., of East Liverpool, in decorative stone china ware, and majolica, and as wealth increases, we shall doubtless witness yet higher accomplishments in encaustic tiles *cloisonne* enamels and dainty porcelains; also transparent china equaling that of the East. Already our ceramic decorations of vases and plaques have, in numerous instances, the boldness and freedom of oil painting, executed with a masterly decision of touch. We are producing plate glass of

any required size free from striæ and telescopic and other lenses of exceptional excellence. We have attained to embossed productions, to articles enameled in various colors, to mirrors framed in flowers and leaves, and candelabra constructed so as to resemble plants; also to glass mosaics flecked or splashed with various colors for mural decoration. In the production of silk ribbons the manufacturers of New Jersey and New York are rivaling those of St. Etienne. Our very machines show a certain elegance of construction which was formerly wanting, and this aiding rather than weakening their serviceability, for the best forms and the best combinations will also be found the most graceful. Our very locomotives have become "things of beauty." In machinery the utmost lightness combined with the requisite strength is introduced, with an obvious gain in effect.

THE PRECIOUS METALS.

The report of the Director of the Mint for the fiscal year ending June 30, 1882, bristles with big figures. The fact that will attract most attention is that the total amount of gold deposited, which was $66,756,653, was $74,000,000 less than the preceding year. The silver purchased for coinage and deposited for bars was about $3,000,000 greater, and amounted to $33,720,491. The total coinage was 11,266,003 pieces of the value of $89,413,447.50, being nearly $11,000,000 more than in any previous year. The imports of foreign gold coin and bullion were $1,789,183 greater than the exports. About one-half the coinage was in eagles; one-third in half-eagles, and the remainder in double-eagles. The silver coinage consisted of $27,772,075 in silver dollars and $11,313.75 in fractional coin, a total of $27,783,388.75. Of the minor or base-metal coins 46,865,725 pieces, of the value of $644,757.75, were struck. The gains from coinage, less recoinage, were $88,814,091 in gold, and $27,651,816 in silver, and by the imports of United States silver coin $517,778, but the export of United States gold coin was $25,008,659 greater than its import, and including $2,700,000 used in the arts, reduced the gain in gold coinage to about $61,000,000. Of the total metallic circulation $148,000,000 belonged to the Treasury, $112,000,000 to the National Banks, and $441,000,000 was in general circulation. The total coin of the country is estimated to have been at the beginning of the year, $439,776,753 gold, and $171,459,766 silver, a total of $611,236,519, and at the close of the year, $500,776,753 gold, and $199,459,766 silver, total $700,236,519, a gain of $61,000,000 in gold coin, and $28,000,000 in silver. The demand for 5-cent nickel pieces was large, and 4,400,775 pieces, of a value of $220,038.75, were struck during the year. The remainder of the minor coinage consisted principally of 1-cent pieces. Gold bars of the value of $37,505,120.04 were manufactured, 12,147,674.90 of which were of fine gold for depositors at the New York Assay Office. Fine silver bars of the value of $7,769,898.15 were also made at the same institution.

COMMERCIAL TRAVELERS.

A number of leading manufacturing houses, particularly in the Eastern States, have given up the employment of commercial travelers, being sufficiently pressed with orders, and possessing a reputation for the production of certain specialties, which assures a continuous flow of custom equal to their facilities of production. Still, these firms would probably allow that their commercial travelers laid deep and broad the prosperity of their success. On the whole, however, the commercial traveler is an indispensable adjunct of business. The benefits resulting from this system are two-fold. First, it enlarges the trade of houses represented, and educates the country merchant up to the wants and demands of the time; and second, he, in turn, introduces new lines and the latest novelties, so that his customers are soon well up with the styles and fashions of the day. The argument that the retail dealer must pay for the convenience of ordering goods at home instead of going himself to market is ridiculous and without foundation in fact. The traveler's expenses are quickly made up by increase of sales on the road over those he would make at home. A good, active man is daily sending in orders and stock is moving all the time, while houses that depend upon orders direct from dealers, in dull seasons find little demand and seasonable goods move slowly; but firms represented in the country, when they find certain lines are accumulating, instruct their salesmen to "push" them, and at once they begin to move. In this day of enterprise and vigor and activity in business it is amusing to find now and then a firm stupid enough to believe that it is possible to retrograde to the ancient time when commercial travelers were unknown and the wheels of commerce only spasmodically moved with certain seasons. A firm in those days that did a business of $300,000 made more money then than now selling up into the millions. But that was before the era of railroads. Now quick travel and communication have changed everything and the old fogy that is waiting for a return of old ways and the old system of doing business, may just as well "stop short," and never try to run any more in the race for business. The average public not acquainted with the manner and system of selling goods by sample through traveling salesmen, have a very confused and eroneous idea of it, and one not very complimentary, while those who really understand its workings know that a man to be a successful salesman must have judgment and force of character; that he must be genteel in style and manner; that he must have a good address and sufficient dignity to command respect; that he must be liberal and broad in his views and well informed; that he must be a good character reader and have the faculty of adapting himself to the peculiar temperaments of his customers; in short, he must be a well-balanced man, capable of holding his own with the present mercantile talent of the day. Such a man is an honor to his house and proves to be a most successful salesman. Let the merchant be favorably impressed with the representative, and as long as the house fills his orders promptly and satisfactorily he continues to buy. In order to cover well the territory tributary to a city, a wholesale firm divides it up, and a specified route is given to each salesman which is known as his territory; this he speedily commences to work, and as he goes over and over it, he learns the character and peculiarities of the buyers; he informs himself of their financial status and manner of conducting business, and soon becomes thoroughly conversant with his entire territory. He makes it a point to reach his customers just about the time they are needing goods and confidently calculates upon an order. He has always something new to present or some attractive drive to offer, and will make a sale although another man has just been ahead in the same line. A warm business friendship soon springs up between buyer and seller, and it is as pleasant to the former to give an order as it is to the latter to receive it. A commercial traveler thus firmly established in the confidence and esteem of his customers, holds well his trade in hand, and every year becomes more valuable to his principals.

THE present large receipts of the Treasury have been attributed by some financial writers to an increase of revenue, but the true cause is the issuing of gold certificates. There has been no important augmentation of customs receipts. As to gold certificates, an apprehension is entertained that the scale on which they are issued will weaken considerably the reserves of the associated banks of New York, which have now $50,000,000 in gold. The *N. Y. Tribune* correctly remarks: When the Treasury series of small gold certificates begins to go out, the retirement of small silver notes, now scattered over the country and used as currency, will be facilitated, and an element of considerable danger will thereby be removed.

THE foreign movements of merchandise at New York last week made a comparison with those of the same week of 1881, which is favorable to the port. But this was due to the unusually small exports for the week of 1881 more than to an increase in amount of the exports of last week, which were $1,011,503 smaller than the preceeding week. The imports of merchandise last week exceeded the exports of merchandise by $2,354,194; for the week of last year the excess was $2,874,753. The value of the merchandise imported last week was $8,946,718, or $535,053 more than for the week of 1881; the value of the merchandise exported was $6,592,524, or $1,055,612 more than for the week of 1881.

MANUFACTURES.

TO MACHINISTS, MANUFACTURERS AND OTHERS.

THE publishers of THE TRADE REVIEW solicit items of information concerning manufacturing and other establishments in any part of the country, and all such items will be promptly inserted in these columns, free of charge. Facts are the only things needed; and all communications should be accompanied with the name of the contributor—not for publication—but as a guarantee of good faith.

Manufacturers, machinist and engineers are particularly requested to communicate any matters of interest relating to their specialties. No one need be deterred from sending any interesting facts in his own language, as all such contributions will be properly revised before sending to press.

OHIO INDUSTRIES.

THE "Mahoning Iron Works," Youngstown, better known as Brown, Bonnell & Co., were established in 1854, by William Bonnell, Joseph and Richard Brown, and are now owned and operated by a corporation known as Brown, Bonnell & Co., and are today the largest of the kind in that section. They include two blast furnaces (the Falcon and Phœnix), having a capacity of about 100 tons of pig metal per day. The entire products of these furnaces are consumed in the rolling mills of this company, which are centrally located. The furnaces and mills, with the railroad tracks and bridges connecting each with the other, have entirely obliterated the site of the old O. & P. Canal, which passed alongside of the furnace and original mill building. The canal has long since been abandoned, the locomotives of the different roads entering Youngstown traversing either side of the yard of these works, and by side-tracks connect with their warehouse. An area of twenty-five acres is fully occupied by the works of the company with their fiery furnaces and scores of belching smoke stacks, presenting from a distance the appearance of a group of active volcanoes. The capacity of these mills is about 75,000 tons of finished iron per annum, and they employ close to 1,500 hands. The principal product of these works comprises merchant, bar, plate, sheet and hoop iron, nails, railroad and other spikes, and 12-pound T rails, all bearing the celebrated Mahoning brand. During the last year there have been many extensive improvements which, with the extensiveness of the works, will be better appreciated by sight than through any description. They have 126 puddling furnaces. There is not a larger mill in the country. The annual pay roll is between $900,000 and $1,000,000.

THE works of the Youngstown Rolling Mill Co. are located immediately west of the city limits and were first put in operation in 1870. The grounds comprise an area of about twenty acres, and the works are fully equipped with the best improved furnaces and machinery for melting and rolling the superior quality of iron, for the production of which this firm has achieved a widespread reputation. In 1877 the mill was consumed by fire, but was immediately rebuilt, the old wooden structure being replaced by a substantial and elegant

iron one 160x148 feet. Connected with this is the forge, a wooden structure 200x125 feet, containing twenty-two puddling furnaces. These, together with the boiler house and various shops constitute one of the best appointed mills of its kind in the country. Their product consists of all kinds of hoop, band, house, wagon box, pole cap iron and cotton ties, of which they make about 50 tons daily. They have excellent railroad facilities for shipping their product to any part of the country. This firm employs on an average 350 men and boys. The business is conducted under the efficient management of Mr. Henry Wick, who is the secretary and treasurer of the company, and to whose energy and sagacity it owes in a large part its success. Their pay roll amounts to about $15,000 per month.

THE proprietors of the Phœnix Iron Works, Wason street, Cleveland, are constructing the great air compressor for the Boston and Albany mine on Lake Superior; also, very powerful experimental machinery in the same line. All kinds of machinery are manufactured at the works, but special attention is given to the manufacture of extra heavy steam engines and other machinery adapted for rolling mills, forges, mines, docks, etc., specially designed to meet local requirements. The great leading specialties of these are the manufacture of superior light and heavy hoisting machinery of every description and for all purposes, adapted for either slow or rapid hoisting, with or without friction clutches, steam boilers, etc. Mr. Thompson has recently invented a friction band hoist adapted especially for rapid hoisting. This machine is one of the simplest we ever saw, it takes less power to run it than any other hoist of equal capacity made. It is next to an impossibility for it to get out of order, as there are so few complications in its construction and it does not require ony special mechanical power to understand its workings.

THE Mahoning Valley Iron Co., Youngstown, is a partnership composed of the firms of Cleveland Brown & Co., and Bonnell, Bottsford & Co., and is managed by H. O. and W. Scott Bonnell The mill was built in 1872 as a rail mill by C. B. and H. K.Wick and others, and was acknowledged to be one of the finest in the country. But the panic of 1873 put an end to railroad building, and owing to the fact that there was no demand for its product it was idle for a considerable portion of the next six years. The present company purchased it in September, 1879, and changed it into a merchant-bar mill. Its product is now about 3,000 tons of finished iron per month, making an aggregate of $1,750,000 per annum. The company owns two coal banks with a capacity of about 150 tons per day—the Allen and Edenburg banks. Its Hannah blast furnace produces 100 tons per day. The company employs 700 to 800 men.

AT Haselton, a manufacturing suburb of Youngstown, Andrews Bros. & Co., consisting of C. H., W. C., and L. G. Andrews, James Nelson and L. E. Cochran, have two blast furnaces with a capacity of 150 tons a day, and give employment to 100 men. Their mill for sheet iron has all the modern improvements, including gas furnaces. In its full capacity 350 men are given employment. There is a foundry and machine shop also here that is at present making many castings for the car works. The same company have the Osborn and Wellendorf coal mines, which turn out 200 tons a day. The pay roll of this firm amounts to $30,000 a month. The business is under the direct management of Messrs. Cochran and Neilson.

THE Lima Machine Works, Lima, builders of light weight locomotives, suitable for wood and iron tramways, and manufacturers of chilled car wheels, axles and boxes, have their hands full. Shay's patent tramway engine, manufactured by them is extensively used throughout the lumber regions, on wood and iron roads of any gauge. It will do more work, with less expense, than a locomotive of the same weight, and on steep grades or short curves is especiably serviceable. It is made strong and durable. The boiler is upright, and is made in such a manner that the tubes are submerged.

THE Youngstown Malleable Iron Co. have a capital stock of $40,000. Henry Tod is president, Paul Wick vice president, and Lucius Andrews secretary and treasurer. They manufacture a general line of malleable castings, called merchant stock, for the hardware and manufacturing trade, and make a specialty of Lambert's malleable wagon iron fellows. They also do a large pattern business and make a general line of custom or job malleable iron for the trade. Their pay-roll amounts to about $1,600 per month.

THE Forest City Machinery Depot, lately removed to 77 and 79 Merwin street, Cleveland, Mr. A. Fisher proprietor, is doing a promising business. The large stores secured afford an effective display of new and second-hand machinery. Mr. Fisher commenced business in a small way, some three years ago, but his thorough knowledge of machinery and business qualities have secured to him a stable and rising position.

THE Ohio Electric Light and Power Co., which was organized in Cleveland some time ago for the introduction of the Sheridan light, is about to branch out and make its presence known, if the negotiations, which are now pending with the city officials prove as favorable as the company expect. It is proposed to put in bids for lighting certain streets on both sides of the river.

HULBERT & PAIGE, Painesville, are doing an overwhelming amount of business. Their specialties are mill building and mill furnishing, engines, etc. They are also the patentees and manufacturers of Hulbert & Paige's "Triumph" power corn sheller, which is capable of shelling 2,000 bushels of ears per day.

OUR Alliance correspondent writes: Messrs. E. H. Fawcett & Son, of the Industrial Works, founders and machinists, have had a very busy season so far on their saw mills and high speed engines. They make sizes of these engines, which are just the thing for any kind of light work, from 2 to 25 horse power.

THE North American Cutlery Co., Painesville, are doing a good business in the manufacture of shears, scissors, etc. Shipments are made to all parts of the United States and Canada; the greatest sales, however, are made in the South and West. The company employs 20 men. Capacity, 60 dozen per day.

IT is stated that the Norwalk shops of the Lake Shore & Michigan Southern Railway are to be removed to Elyria or Berea, so as to render them more accessible to the Sandusky division of the road, and that a site has been found just East of Olmstead Falls and Berea.

THE Cleveland Crucible Steel Works, Garden street, crossing of C. & P. R. R., were never more busy that at the present time. The company largely increased its capacity last year, bringing it up to ten tons of steel per day. They were established in 1880.

THE Youngstown Steel Works is pushing the completion of the new buildings, the company being desirous of getting the works in order for making steel as soon as possible. They expect to be ready to make steel castings early in November.

THE Franz & Pope Knitting Machine Co., Bucyrus, manufacturers of American hand and power knitting machines, also seamless plain and fancy hosiery, employ sixty hands and ship $5,000 worth of goods monthly.

THE Bridgeport Boiler Works of Lowe & Thompson employ 40 hands. The works were established fifteen years since. A large general shipping trade is done. The proprietors are William Lowe and James Thompson.

HESS, SNYDER & Co., patentees and sole manufacturers of the "Novelty," wood and iron combined force pumps, Massillon, and who employ 65 hands, are exceedingly busy at this time in the store department.

THE Enterprise Machine Co., Geneva, has made additions to its working force. Castings of first-class quality are being turned out. It has orders on its books to the value of $40,000.

THE Morse Bridge Works, Youngstown, are making the iron work for the roof of the tunnel of the Pittsburgh, McKeesport & Youghiogheny road in Pittsburgh.

THE Buckeye Brass Works, Dayton, incorporated in 1876, employs 150 men in engine building and in furnishing the appliances for water and steam fittings.

THE Champion Harvesting Machine Works, Springfield, will soon have one of the finest machinery plants in the country.

PINE GROVE FURNACE, Hanging Rock, has the jacket for calcining oven in position. It will soon be ready for operation.

BROWNELL & Co., machinists, Dayton, find business growing on them. They employ over 100 hands.

ALICE FURNACE, Ironton, is running on mill iron, having a large order for this grade of metal.

THE Smith Bridge Co., of Toledo, have increased their capital stock from $60,000 to $80,000.

THE D. W. Miller Co., of Cincinnati, has been incorporated with a capital of $100,000.

THE American Alarm Door Co., Cincinnati, has been incorporated; capital $25,000.

THE Norwalk organ factory is making heavy shipments.

INDUSTRIES IN GENERAL.

MAINE.

THE scythe factories at West Waterville are now fully under way, and some of them have orders for all the scythes they can make this season.

THE ship yards at Portland are crowded with work, and there is a great demand for skilled labor in ship building.

A MAMMOTH pulp mill is being erected at West Great Works, near Bangor, by the Penobscot Chemical Fibre Co. The building, of brick, will be 346 feet in length.

MASSACHUSETTS.

THE business of the emery and corundum wheels at Chester, has been purchased by Springfield parties who have re-organized it with a capital stock of $50,000. They will build a new mill 100x40 feet.

THE buildings for a rubber factory at Franklin will consist of a brick structure, 50x103 feet, two stories high and one of wood the same size and one story.

THE Putnam Tool Co., of Fitchburg, has been organized with a capital of $30,000, for the manufacture and sale of machine tools, steam engines and other kinds of machinery. S. W. Putnam, is President; George E. Putnam, Treasurer; also the Fitchburg Tool Co., of Fitchburg, with a capital of $4,000, for the buying and selling of new and second-hand machinery. George E. Putnam, President; S. W. Putnam, Treasurer.

RHODE ISLAND.

OUR Providence correspondent writes: The Providence Saw and Tool Works, manufacturers of saws, fly frame flyers, pressers and fluted rolls, 25 Calender st., have been established fifteen years. The firm employs 25 hands, and are making active shipments to New England and the Middle States. A great amount of general machine work is done by them.——The Victor Sewing Co. employs 100 hands. The company has manufactured these machines for 15 years and with a steadily increasing sale. The president is Mr. Frank D. Sloat, the superintendent Mr. George M. Pratt, and the secretary Mr. W. L. Blake.

THE New American File Co., Pawtucket, have operated their business several years. The average number of their employes is 200. They were awarded a medal for the excellence of their files at the Centennial exhibition.

THE foundation for a third tall chimney is being laid at the new rubber works at Bristol.

CONNECTICUT.

OUR Middletown correspondent writes: One of the large manufacturing firms here is that of W. & B. Douglas, manufacturers of pumps, hydraulic rams, garden and fire engines. They employ 275 hands. The business dates back to 1832. The firm never seems to have known dull times. Their engineering reputation has secured them an export taade. They manufacture an extraordinary number of styles of pumps.

AT Hartford, the Billings & Spencer Co. have recently purchased the file shop property, and are erecting new buildings thereon, and increasing the number of drop hammers, making 34 in all, an increase in 12 years of from 2 to 34.

THE Meriden Silver Plate Co., Meriden, have erected a new building for cutting glass, 65x35 feet, and raised the main factory one story, making one of the finest burnishing rooms in the business.

CONNECTICUT's fame as a producer of brass and

metal goods is great and far spread, and not the least prominent among her manufactories is that of the Plume & Atwood Manufacturing Co. This concern, although located in Connecticut, does not belong merely to that State, but may be claimed by various sections, for its vast and far-reaching operations have made the establishment of branch houses in the great cities of the Union imperative; and Boston shares in this ownership. The brass and rolling mills of the company at Thomaston are, as usual, very busy, and are driven to the very verge of their capacity to supply the demands upon them.—*Boston Manufacturers' Gazette.*

NEW YORK.

OUR Buffalo correspondent writes; The Clark Builders' Hardware Manufacturing Co., have added to their already extensive line of manufacture, that of lock making, in which they employ from fifty to sixty hands exclusively. They make a specialty of fine bronze, nickel-plated and lacquered house and cabinet trimmings, besides a large assortment of the common kinds of locks; this department is under the able management of the Mix Brothers, late of the Westfield Lock Works of this State.

THE Gilbert Car Works in Buffalo, have taken a contract to build 200 hopper-bottom coal cars, to carry 20 tons each, for the Buffalo, New York & Philadelphia road.

TREVOR & Co., Lockport, manufacturers of shingle-heading machinery and shingle and heading saws, are doing a large business. The shingle heading and saw machine meets with marked favor, owing to its simplicity and the peculiar manner of presenting the angle of the saw to the timber, also from the advantage of a thin cut, thus saving material.

MESSRS. C. E. Jennings & Co., 96 Chambers st., New York, have issued their illustrated catalogue of mechanics' tools and hardware specialties for 1882. The index is quite an exhaustive one. The excellence of the goods supplied by this firm has built for it a high reputation.

PENNSYLVANIA.

THE Union Iron Works, 307 Pine st., Meadville, Curry & Co., proprietors, employ 6 hands. This firm has had an exceedingly busy season, and prospects are good.

ILLINOIS.

THE open-hearth steel plant of the Calumet Iron and Steel Co.'s woaks at Cummings, which has been under construction for some time, is just completed, and the company will be turning out steel next week. This plant has a capacity of turning out 50 tons of steel per day.

THE Chicago Galvanized Wire Fence Co. are adding twenty new barb wire machines to their works.

THREE of the four blast furnaces of the North Chicago rolling mills at South Chicago are now completed and the works are running in full force night and day. At present from 150 to 250 tons of steel are turned out per day of twelve hours, and when the fourth furnace is completed—in the course of a few weeks—400 tons will be turned out every twelve hours. Fifteen hundred men are employed at present, and upon the completion of the remaining furnace 100 more will be added to the force. Most of the rails made are sixty pound rails, and are worth $50 per ton. The demand is good—in fact orders are turned away—and the market fair. An order of 3,000 tons for the Illinois Central Railroad Company is now being filled.

MISSOURI.

THE Kansas City rolling mills are now employing 500 men in rolling and forging, with a monthly product of some 2,500 tons of rails, splice bars, spikes, bolts and nuts, bridge iron, frogs, switches, etc. During the past year the company have doubled their spike capacity, and placed in machinery for the manufacture of bolts and nuts. The capital stock of the company was recently increased from $300,000 to $700,000. Last year the product of the mill was over $1,000,000, which, it is expected, will be largely increased this year.

MESSRS. Hall & Co., of East St. Louis, contemplate engaging in the manufacture of iron shingles. These shingles will have holes and hooks by which they may be fastened in position and will be enameled so as to make a very handsome roof.—*Age of Steel.*

A. LESCHEN & SON, St. Louis, report trade very good, both in hemp and packing wire rope. They received orders one day this week for over 30,000 feet of wire rope, and are at present three weeks behind their orders.—*Ibid.*

WISCONSIN.

A STOCK company with a capital of $50,000 has been formed at Ashland, to manufacture buggies and carriages.

CORRESPONDENCE.

FROM OUR SPECIAL TRAVELING CORRESPONDENT.

CANTON, O.

The Canton Car Co., manufacturers of all kinds of freight cars, car, bridge and railroad castings, have a capacity of ten cars per day. They employ 150 men. Their orders are for 400 cars for the Wisconsin, Iowa & Nebraska Railroad; also 50 for the Washington & Western.——The Miller Co., manufacturers of the Torrent and Unique steam pumps have been running two shops in this city for the past two or three years. They are now employing 100 men in the manufacture of their steam pumps and castings. On their monthly pay-day, they paid out over $5,000. They are running both their foundries and are making and putting in one of their Safety Economy boilers of forty horse power.——Bucher, Gibbs & Co., who have the largest plow works in the State, established in 1866, have resumed work after being shut down a short time for repairs. They employ a full force of hands and trade has been very good. The excellence of their plows has placed them in possession of testimonials from a host of farming localities.——A. Ball & Co. have done a better business than ever with the Red Jacket, as well as Ball's Sulky Plows. The sulky plow dispenses with the power-lift in motion and is easily controlled.——Ebersole & Kailey are doing a good business in their machine and jobbing shop. They employ eight hands. The firm is handling a new milling machine of their own design, for which they claim superiority over anything of the kind in the market. When completed I will furnish you full details as to its working.——Beldon, Burner & Co., 158 and 160 S. Market street, manufacturers of vapor gas-lights for streets, factories, dwellings and halls, have lately erected a large frame building well suited to their purpose. The street lighting attachments convert the distillations of petroleum into gas which yields a brilliant light, is simple, cleanly, perfectly safe and thoroughly practical in all respects. They are now, and for several years have been, used by a number of cities and towns. They are, besides, contractors for street lighting.——In my letter from Akron I referred to Mr. W. A. Mountain's side-delivery, bee-line and rod hay carrier. Mr. Mountain is a resident of this city, and after he receives a patent for this invention will manufacture it on a large scale. It is certain to come into general request. No hay carrier approaches it in serviceability.——Mr. P. P. Bush, iron founder, employs 28 hands, and has plenty of work to keep him going until January next.——The proprietors of the Canton Saw Works employ 18 hands. Trade is reported as good and fully equal to that of last year. The advantages of their saw are the less power required, the cutting the grain of timber but once, the smoothness of the work, the self feeding action of the saw, and the fact that a thinner saw can be used, thus saving timber.——Mr. G. B. Turner, of the Variety Iron Works, is busy with milling machines. Amongst these is his New Idea Grain Separator, a combination of riddles and suction vertical blast, with a cockle screen. All riddles, including cockle screen, can be cleaned off while the machine is in operation. It has a straw spout to catch the offal from the riddles, a large screenings hopper, which prevents the heavy screenings from passing through the fan. All parts are conveniently arranged. The peculiar feature of the New Idea, and which distinguishes it from all other separators, is the long shaking spout, which no other separator has, and which enables it do better work than any other machine can do.——The new American House, of which Mr. W. G. Hipp is pro prietor, is an extensive one, admirably furnished, the appointments including the latest improvements; the table d' hote is beyond praise, and has contributed greatly to the reputation of this fine establishment.

THE Sturtevant Lumber Company, Cleveland, has been incorporated; capital stock $200,000, in shares of $100 each; by Carlos M. Sturtevant, C. C. Burnett, Jacob, Michael, Philip J. and Martin Striebinger.

RAILROADS.

THE Grand Trunk system now embraces 3,330 miles.

A ROAD, to cost $3,000,000, is to be built from Brooklyn, Ill., to Shawneetown.

THE Wheeling & Lake Erie Railroad has been opened from Wheeling to Detroit.

A SHORT line is to be opened up by the Missouri Pacific from Kansas City to St. Louis.

THE California Southern is completed to San Diego, 669 miles from San Francisco.

A RAILROAD is to be built between Buffalo and Toronto. It will be ten miles shorter than any existing road.

TRAINS are to be running on Nov. 1 on the Chicago and Atlantic Railroad between Chicago and Marion, Ohio, 250 miles.

THE New York, West Shore and Buffalo Railroad when completed will, it is said, be the most expensive road ever constructed for the distance.

THE Denver and South Park division of the Gunnison branch is now completed to Gunnison, 207 miles from Denver, 72 miles from the main line at Buena Vista.

IN Texas, 1,461 miles of new roads were constructed last year, costing nearly $50,000,000. The State has now thirty-four railroads, aggregating 5,908 miles in length.

EDISON is now building a forty-ton electric railway engine, designed to haul a train of cars, full size, at the rate of fifty miles an hour, which will be put into practical operation in England.

IN Massachusetts, where the records have been systematically kept in the past ten years, there have been carried in that time 400,000,000 passengers, of which number but 581 were injured, and of these only 132 fatally.

CHINAMEN on the Northern Pacific Railway, the cheapest labor in this country, are paid $1.16 a day—about five shillings in English money. The ordinary day laborer in Great Britain is paid only two shillings—forty-eight cents — a day for the same kind of work.

JAY GOULD was the first to see any real value in the stock of the Union Pacific. Years after it was completed its stock was worthless, and was not quoted at all. In 1870 it made its first appearance on the stock list, running up in December of that year from 8 to 18⅞ per cent. in va'ue. A year later it had crawled up to 30, in 1872 to 38, in 1873 it closed the year at 33, in 1874 at 37. In 1875 Jay Gould bought in, and it ran up to 81.

THE opening of railway communication with Mexico has already begun to bear fruit. Many Mexican names begin to be seen on the registers of American hotels, and heavy orders for merchandise have been received from Chihuahua at St. Louis, Chicago, and other northern cities—the forerunners, it is to be hoped, of a large trade between the two countries, whose facilities for intercommunication are rapidly increasing.—*Chicago Railway Age.*

THERE are now employed on the New York, West Shore & Buffalo, and the New York, Ontario & Western Railroads, from Weehawken to Middletown and from Cornwall to Syracuse, 18,294 men, 115 steam and compressed air drils, 14 steam excavators, and 4 dredging machines. There are also 3,131 horses and carts, 27 locomotives, 1,080 cars, 14 pile drivers, 76 steam derricks, 10 steam pumps, and 23 tugs, barges and canal boats.

IN round numbers 7,000 miles of railroad have been constructed so far this year, against 4,200 miles for same time last year. The earnings show a corresponding improvement. During July 68 roads, aggregating 51,020 miles, reported aggregate earnings of $30,019,504, or 10 per cent more than for same month last year. For seven months, ending July 31, 62 railroads, aggregating 49,470 miles, earned $108,633,720 or 12.4 per cent. more than last year.

MACHINE FOR PIERCING BOILERS.—Mr. Alex. A. Smyth, manufacturer of boilers, stills and tanks, Titusville, Pa., who is doing a large and prosperous business, has applied for a patent for a machine for piercing flues and boilers, which is not only labor-saving, but performs its work in a manner which will commend it to all makers.

ITEMS OF INTEREST.

The price of brick has declined to $5.75 per thousand and builders claim that the price will be still lower before fall.

At present the amount invested in cotton mills in the South is estimated at $50,000,000, about one-third of which is said to have been invested during the past two years.

The New York bean crop is almost an entire failure, and dealers there are getting fancy prices, which probably will not be maintained, as the West and Canada have a fair crop, which together with importations will keep prices down.

For some years a ship-canal has been quietly constructing from the sea to St. Petersburg, with the purpose of making the Russian capital one of the commercial emporiums of the empire. It was completed last month, is fifteen miles long, and vessels drawing twenty-two feet of water can proceed direct to the city.

How silly it is for men to speak of capital as the enemy of labor, when the fact is that a great part of capital is wealth to be given to the laborer, and speaking generally, the greater the amount of the existing capital, the greater the share of the produce that will fall to each laborer.

The assessed value of the property of the people of the United States in 1860 was $12,084,560,005, or half the calculated value. The assessed value in 1870 was $14,178,986,732, or half the calculated value. The assessed value in 1880 was $16,902,755,893, or half the calculated value.

Edison has recently secured a patent for a device for raising or lowering the electric light at will. The new invention is called an "adjustable resistance," and is operated after the manner of a German student lamp. The light can, by a single touch, be raised to its full power or lowered to a mere spark. The cost of the device is $2.50 for each light.

Isn't it a little strange that as yet there is no direct telegraphic communication between North and South America? Dispatches now go by way of London, Lisbon and Rio Janeiro. It is said that lines will soon be run direct to Panama, Callao and Valparaiso through Mexico. Dispatches to China and Japan also go via Europe, there being no Pacific cable. London still remains the telegraphic centre of the world.

A trial has been made in Pittsburgh, says the American Architect, of an electric motor for common street cars, which is said to be quite successful. As in the Siemens and Halske Railway, the current is conveyed by means of a wire, suspended from brackets attached to posts set beside the track, on which runs a pulley connected by wires with the car. The electro-motor appears to be of the ordinary kind, and is said to be capable of driving the car at the rate of ten miles an hour.

A document issued by the United States Agricultural Department gives the sum of $1,103,444,352 as the value for the last census year of the agricultural products, horses, mules, cattle, sheep and hogs of the fourteen Southern States, including West Virginia and Kentucky. But this does not embrace such important productions as rice, sugar, molasses, fruits and vegetables, poultry, game, fish and oysters, lumber, oats.

Sixty head of cattle are killed each day for preserving and thirty head each day boiled down for tallow at the works of the Queensland Meat Preserving Co., Australia. None but prime beef is selected for the former. The meat is first parboiled or blanched, then cut in sizes to suit the different tin packing cases, soldered in, and a hole having been perforated in each lid, is placed in large retorts where the cooking is finished. This completes, with the soldering of the hole, the preserving. The perforations are closed and the cases ready for exportation.

A significant feature of the use of electric lights n agriculture, and one pregnant with great possibilities for the insect-tormented farmer, is, the London *Globe* thinks, the wonderful inducement which the light offers to all sorts and conditions of insects to attempt multitudinous suicide by banging their heads against the crystal globe all through the night and the small hours of the morning. A simple mechanical arrangement, in the shape of a grated trap, into which the impulsive creatures could fall, and whence they could not extricate themselves, would assist them to complete the happy work of self-destruction.

Foreign steam and sailing vessels still offer to carry freight to Europe at merely nominal rates, but light supplies of produce and a lack of shipping margins serve to restrict the outward movement within comparatively narrow limits. Vessels engaged in the trans-Atlantic trade are suffering as they probably never suffered before, and a variety of interests more or less intimately connected with them are accordingly in a languishing condition.

MECHANICAL RECEIPTS AND ITEMS.

To Mend a Rubber Belt.

One method to mend a rubber belt is to melt common isinglass in water, the same as ordinary glue; add a little alcohol and apply hot. Another is equal parts of shellac and liquid india rubber, the shellac to be dissolved in alcohol by putting both in a tightly-corked bottle, standing in a warm place, and shaking occasionally. It should be quite thick. After a rubber belt has begun to wear out, it is better and cheaper to get a new one than to mend it.

Starting an Engine.

Before starting an engine always warm up the cylinder by admitting the steam to both ends. If a marine engine, see that everything is clear of the engines and propeller, and that the cocks and valves are all right. Whenever an engine is stopped for any length of time, examine all its parts for the purpose of seeing if they are in good order. Warm the boiler gradually. Do not get up steam from cold water in less than six hours. If possible light the fires over night. Nothing turns a new boiler into an old one sooner than getting up steam too quickly. It hogs the furnace tubes, leads to grooving, strains the end plates and sometimes rips the rim seams of rivets at the bottom of the shell.

Bending Copper Tubes.

For bending copper tubes, says the *Manufacturer and Builder*, replying to a query, the almost universal practice, so far as we can learn, is to fill the tubes with lead or resin, then turn a groove in a chuck of the same radius as that required for the bend, and bend the tubes around this. The lead or resin may then be melted out. A machinist of Philadelphia some years ago devised an ingenious apparatus for this purpose, which we are somewhat surprised to find has not come into general use. It consists of a flexible mandrel of steel, made of wire of square cross-section, and with the coils lying in contact so as to form a close spiral. By inserting one of these of the right diameter into the tube, it can be bent to any angle without showing the slightest symptom of wrinkling; when properly bent the mandrel can be readily withdrawn by simply taking hold of one end of it, giving it at the same time a slight twist to lessen its diameter. At the time this invention was first brought out it was very well spoken of, but of late we have lost sight of it. It certainly answered its purpose very well.

To Temper Steel Springs.

Heat to an even red heat, rather low, to prevent cracking; quench in lukewarm water; place in ladle with tallow to cover; heat until tallow burns with a large flame spreading beyond ladle, then set the ladle aside and allow it to cool. Will stand frost, or work under water.

Nickel Plating Without a Battery.

To a dilute solution of chloride of zinc (5 to 10 per cent.) enough nickel sulphate is to be added to impart a decidedly green color to it, and the solution is then to be heated to boiling in a porcelain vessel. The clouding of the liquid from the separation of a basic zinc salt need not be heeded, as it will not interfere with the effectiveness of the bath. The articles to be nickel-plated are first freed from oxide or grease, and then suspended in the solution from 30 to 60 minutes, the bath being kept at a boiling temperature. When the articles are observed to be uniformly coated they may be removed, washed in water, in which a little chalk is suspended, dried, and finally polished with chalk or other suitable material. By the substitution of a cobalt salt instead of nickel, objects may be similarly coated with cobalt.

USEFUL RECEIPTS.

Waterproof Canvas for Covering Carts, etc.—9½ gallons linseed oil, 1 lb. litharge, 1 lb. umber, boiled together for 24 hours. May be colored with any paint. Lay on with a brush.

To Imitate Ebony.—Wash any compact wood with a boiling decoction of logwood three or four times, allowing it to dry between each application. Then wash it with a solution of acetate of iron, which is made by dissolving iron filings in vinegar. This stain is very black and penetrates to a considerable depth into the wood, so that ordinary scratching or chipping does not show the original color.

To Make Varnishes Adhere to Metal.—To make alcoholic lacquers or varnishes adhere more completely to polished metal surfaces, one part boracic acid should be added to 200 parts of varnish. This composition will adhere so firmly and become so completely glazed as to be removed only with difficulty. Be careful not to add too much of the boracic acid, as it injures the gloss in that case.

Plate Polishing Paste.—An excellent preparation for polishing plate may be made in the following manner: Mix together 4 ounces spirits of turpentine, 2 ounces spirits of wine, 1 ounce spirits of camphor, and ½ ounce spirits of ammonia. To this add 1 pound of whiting, finely powdered, and stir till the whole is of the consistency of thick cream. To use this preparation, with a clean sponge cover the silver with it, so as to give it a coat like whitewash. Set the silver aside till the paste dries into a powder; then brush it off and polish with a chamois leather. A cheaper kind may be made by merely mixing spirits of wine and whiting together.

To Measure Heights.—The hypsometer is the name of a useful little instrument for measuring heights of walls, timber, trees and spouting, and therefore valuable to surveyors, builders and artisans. The plan is to take a triangle, composed of three slats similar to the carpenter's angle, and on each end of the longer side place a small sight vane; suspend from the lower side a metal ball to keep this side horizontal, and construct a handle, with a circle at its upper end, in which the triangle can rest and move, and by which it will slide into the proper position by the weight of the ball. Take the instrument by the handle and move backward until the two sights are brought into line with the top of the building or other object. The height will be found by adding the distance of the operator from the building to the height of the eye above the ground.

To Color Woods.—How to make woods, such as cherry, mahogany, etc., look like ebony, is often desirable. The following directions are given: To imitate black ebony, first wet the wood with a solution of logwood and copperas, boiled together, and laid on hot. For this purpose two ounces of logwood chips, with 1½ ounces of copperas, to the quart of water, will be required. When the work has become dry, wet the surface again with a mixture of vinegar and steel filings. This mixture may be made by dissolving two ounces of steel filings in one-half pint of vinegar. When the work has become dry again, sand-paper down until quite smooth. Then oil and fill in with powdered drop black mixed in the filler. Work to be ebonized should be smooth and free from holes, etc. The work may receive a light coat of quick-drying varnish, and then be rubbed with finely pulverized pumice stone and linseed oil until very smooth.

Animal Oils in Boilers.—Fatty or animal oils and tallows are very detrimental when they get into steam boilers with water containing solid matter. It is extremely difficult to separate fatty oil from hot feed water after it has been thoroughly mingled with it by coming with the exhaust steam from the cylinder into the open or spray heater whence it finds its way into the boiler and with the solid matter forms a sticky deposit when the water is blown out, which adheres to the iron and is baked by the remaining heat into a hard greasy mass that effectually prevents afterwards the water reaching the iron. Mineral oils are not so bad and should always be used for cylinder lubrication where the heating of the feed water is done by mixing it with the exhaust steam.

Trains run from Paris to Vienna in 24 hours.

PRACTICAL MECHANICS.

STANDARD HOLES,

By Joshua Rose, M. E.

It is impracticable to bore with a single-pointed tool, a hole that should be true, parallel and smooth; but let me explain just what is meant by that. There is no difficulty whatever in boring a hole cylindrically true, and in a good lathe, parallel and smooth, in the common acceptation of the term; that is to say, the tool marks will be visible to the eye, but not to the sense of touch. I have never found any difficulty in the matter while the work was in the lathe nor after it left the lathe chuck, unless the work was in two halves, as a pair of brasses, or an eccentric. But these, though bored cylindrically true, are always oval as soon as relieved of the pressure of the chuck, or holding bolts. Nor have I ever found much difficulty in boring holes to standard diameter, especially if the lathe has a compound slide rest, because the top slide can be set at an angle, and used to put the feed on. In any event, however, the little feed adjusting attachment may be used to prevent the cut being too much. or what is the same thing, to prevent the feed-screw handle from moving too much. But this feed attachment is no use as a stop to enable a number of bores to be cut to one standard diameter—no use at all for that purpose—though of much use to give you an idea of when you are approaching the size, providing you set its position with that end in view, and as before stated, to prevent the slide rest from being moved too much. The reason is, as will appear presently, that the slides must, for boring, fit tightly; and under this condition it is impracticable to know just when the feed-adjusting attachment is acting as a stop, or to bring just the same amount of pressure to bear against it. With a loose slide you may come pretty near it; with a tight one, not. Again, every time you take the tool out to grind it you destroy the combination of the tool point, with the contacts of the stop motion, and cannot set it again, but by trial. Now to finish a hole with the highest degree of perfection known to the art, a single-pointed boring tool must be ground up for the last cut, and this "knocks spots" out of the adjustment of the feed regnlating or adjusting attachment, because, in proportion as the tool is dull, it springs away from the work; hence, in putting the tool back, after grinding it, it is of no use to set it to the bore of the work for that has left the tool spring out of the question.

Small holes must be finished by reamer, and up to about two inches all holes are best so finished. The question before us is: What shape shall it be; how many cutting edges should it have; what clearance ought it to have, and what shall the shape of each tooth, individually, be? First, as to general shape. To ream parallel, it must have parallel cutting edges; but if it be parallel, from end to end, there is nothing to steady it when entering and prevent its cutting the mouth of the hole too large; hence it is better to slightly taper the end for a distance equal to at least the diameter.

It is a very easy matter to grind one cutting edge straight and true, and to resharpen it. With one cutter, the principle of making that cutter adjustable for cutting diameter, may be applied to reamers of smaller diameter, and the cutter can be held firmer in the stock. The body of the stock in a reamer, adjustable to take up the wear, can be made to stand size hardened, and the half circumference on the cutting edge side can be eased away, thus obtaining two great advantages. First, that the reamer cannot ream a hole too small, because of the stock being a full half circle on one side; second, that this half circle will steady the reamer, an end very difficult of attainment if the holes are short. A single tooth can be easier fed to its cut, since it will be easier to rotate and pass to its cut. In the case of taper holes, a single tooth can be fed very much easier and will be free from the sud den release from the cut, which reamers having much taper and a number of teeth are subject to, while a finer degree of cut can be taken. This is of importance in a taper hole, because wherever the teeth leave off cutting the hole must be out of round to the depth of the cut, hence this cut should be as fine as possible. It may be that the half circular side of the stock should have some grooves, to free any dirt that might get in between it and the hole.

The clearance is the next consideration. The more the clearance the more a given amount of wear will decrease the size of the reamer, but the easier the reamer can be moved or fed to its cut. The less the clearance (so long as there is clearance) the easier the reamer may be kept to stand ard size, but the more the power required to operate it and feed or push it to its cut. The more the number of cutting edges the more the clear ance must be, which is another point in favor of a single-tooth reamer; hence the clearance is a quantity varying with the conditions. On taper holes, however, ample clearance is a decided advantage. An obtuse angle of the groove or flute face is better than a radial face, as it does not lose its edge so soon.

The trouble in parallel fits is that the contact of the surfaces can only be adjusted after the surfaces are produced, or in other words, the fitting must be done after the work is down to its finished size. But where then is there any metal to fit on? This brings us face to face with the fact: The actual fit must be attained by making the work as cylindrically true and parallel as the machines will produce it, and be satisfied with the degree of fit thus produced. I have been careful, while on this part of the subject, to use the word parallel, because all these difficulties as to fit disappear if the work be made taper, because the work can, in that case, be tried for fit before being reduced to its finished diameter, and fitted during the subsequent reduction. The enveloped may be pressed into the enveloping piece, and by rotation the contact marks will show the high spots and places. It is proven then that a taper fit is more easily made than a parallel one, a fact that is not generally acknowledged, because the kind of parallel fits usually made are not the kind of fits I refer to—they simply have no play, while I mean no play and surfaces in contact all over. If, however, in order to obtain the fit, the work be made taper, what becomes of the standard gauge system?—*Boston Jour. of Commerce.*

INDUSTRIAL SCIENCE.

Wonders of Simple Tools.

A complicated engine like the common woodworker, the printing press, a compound lathe, or various forms of spinning and weaving machines, is really one of the most wonderful things in the world. Most of such contrivances are the product of the combined thought, study, experience and ingenuity of generations and ages; yet some of the simplest tools, either in their construction or use, represent a degree of ingenuity and manual skill which is astonishing. A common file is one of the simplest tools to look at, and to a careless view one of the easiest to make. Files have been in use from the beginning, and rank with the hatchet and hammer in simplicity and usefulness. From the time the naked savage smoothed his arrow head with a bit of sharp gritted stone, and the handle of his club with a piece of dried fish skin, to these days of finely finished work, the race of man has employed some form of file to accomplish mechanical results. Yet the making of the hardened steel file which is now so universal requires a delicacy of touch and exactness of movement that is wonderful. The diagonal cuts upon the sides of a common "three-cornered" file appear to the eye to be absolutely regular, uniform in their relative distance and alike in depth; the keenest vision is unable to detect any irregularity, and their cutting seems to be the work of a delicate and accurate machine. A close scrutiny also shows that the cuts grow finer, closer and shallower by almost imperceptible degrees of variation as they approach the tapering point. Upon the smaller files of the regular sizes there are more than two hundred of these parallel cuts to the inch, and in some of delicate make, for special purposes, this degree of fineness is greatly exceeded. Yet this wondrously delicate and accurate work is done, not by the aid of machines with minute micrometer screws and guages, but with a simple hammer and chisel in the workman's hand. The advance of the chisel upon the blank at each cut of the two hundred and fiftieth part of an inch, neither more nor less, is regulated simply by the unaided sense of touch. The weight of the blow, also diminishing or increasing at each stroke by the fraction of an ounce as the cutting approaches or recedes from the point, is regulated solely by the judgment of the workman. All this is done without pause or hesitation to correct or re-adjust, and with a rapidity which shows itself in the cheapness of the finished file. File cutting is rendered still more delicate and difficult by the varying hardness of the same bit of steel at different points in its surface, which would cause blows of equal force to make cuts of varying depth and width. This unequal hardness must be perceived as the cutting progresses, and allowance must be made for it all through the operation. Doubtless all this seems easy enough to the practiced file cutter, and he does his work without even thinking of these difficulties. Yet the education of hand, nerve and brain to such a perfection of movement is certainly a most wonderful illustration of perfection attained in the use of tools. For more than one hundred years efforts have been made to cut files by machinery with only partial and moderate success, the process, simple as it appears, being too delicate for less perfect instruments than the human hand and brain.

Electricity Rivaled by Metallic Gas.

Whilst the gas companies have been viewing with more or less dread the rapid progress which has been made in the development of the electric light for domestic and other use, they have not, we believe, been aware of the discovery of a new illuminating gas, which the inventor claims can be made at about one-tenth of the cost of coal gas, whilst it possesses vastly superior illuminating powers. The patentee, Mr. John Dixon, of Liverpool, England, has, it appears, spent the best days of his life in perfecting the invention, and has secured all necessary British and foreign patents. A limited liability company has been formed to work the patent, and with sufficient capital to do it successfully, large sums of money have been expended in developing and protecting the invention, until now patent rights have been secured in nearly every country of importance. Mr. Dixon claims for his invention the production of improved gas for illuminating purposes by the decomposition or dissolution of the component parts or constituents of metals, earths, acids, carbon, and hydrocarbon substances, the salts of alkalis, the dissolution of the substance being caused by heat. It has long been known that certain chemical substances, when strongly heated, produce flames of peculiar colors, which, when blended, produce a white light, and, acting on this knowledge, the inventor has realized what he says has been the dream of his life, and produced an apparatus capable of manufacturing and storing a gas, the result of the decomposition of the aforementioned chemicals, so that now he is prepared to supply a gas which, he says, is not only superior to but vastly cheaper than any supplied by other persons or companies in any part of the globe. The model works erected in the Commercial-road, Liverpool, are the first in complete working order, and are capable of supplying gas for upwards of 1,000 ordinary burners. The estimate of the inventor is that, whereas 1,000 men will produce a given quantity of coal gas, three men under his system will obtain a like quantity of metallic gas, and give a superior light of at least six times the luminosity. In every conceivable way has the metallic gas been tested, and in some instances so crucial were the tests that the gas has been stored for upwards of 12 months, and its virtues were found to be unimpaired. Neither time nor weather seems to affect it. It has been found to travel any distance through the ordinary mains and pipes, and with the special advantage that neither condensation nor water is perceptible. An important feature in the consumption of new metallic gas is its purity, and the entire absence of any obnoxious sulphurous smell, vapor, or smoke. Tested with sheets of white paper, and held over the flame of each gas for a short time, the coal gas tinged the paper and left a slight deposit of soot, while none was perceptible in the other. Its cleanliness is as apparent as it is devoid of smell while burning. On applying the nose to the naked burner and the taps turned on, the new gas is not so unpleasant as the old, but its presence in case of a leak might be easily detected. Mr. Dixon affirms that if his gas was adopted he would be able to supply it almost anywhere at less—very much less—than the lowest rate charged by any gas company in existence to-day. In the manufacture of the new metallic gas retorts are employed similar in every respect to those of the ordinary gasworks. The retorts and their contents are then heated to not less than a "cherry" red heat. After generation in the retorts, the gas is led through a pipe, and the condensed vehicle is deposited in a recoverer.

SCIENCE AND INVENTION.

Cylindrical Glass Vessels.—At present, large, glass cylindrical vessels for scientific and commercial purposes are cut during manufacture by surrounding them with a thin filament drawn out from the molten glass, and then cooling them suddenly by contact with a cold substance. A more sure and perfect method has been devised by Herr Fahdt, of Dresden, who surrounds the glass vessel with a copper wire, connected by binding screws with the two poles of a galvanic battery, and made red-hot by forming contact. The rough edges are then rounded off by turning the object in a blow-pipe flame; and, to prevent any unequal contraction of the parts subjected to this action, a slight annealing is effected in the furnace.

Metallic Alloy for Silvering.—A metallic alloy for silvering has been invented by M. de Villiers. Its ingredients are eighty parts tin, eighteen of lead, and two of silver, or ninety parts tin, nine of lead and one of silver. When the tin is brought to a bright white heat the lead is added in grains and the mixture stirred with a stick of pine wood. The fire is increased until the surface of the bath, to which the silver has just been added, assumes a yellowish hue, when it is thoroughly stirred up and the alloy cast in bars. Articles to be coated with it must first be carefully cleaned with the aid of hydrochloric or sulphuric acid, and having been heated to 70 or 80 degrees, must be left in the melted alloy from one to five minutes, as their size, etc., may require. Excellent results are said to be obtained, but the work would seem to require much practice on the part of those undertaking it before they can assure success.

Thinness of the Earth's Crust.—News comes from Panama that at the time of the recent earthquakes there, four huge waves rolled in from the Atlantic upon the coast of San Blas, and overwhelmed several small villages on the mainland and adjacent islands, drowning about seventy persons The readiness with which the ocean responds to the impulse of an earthquake shock constitutes one of the great dangers that the inhabitants of low coasts in volcanic districts like Central America have to face. The more such phenomena are studied the less stable the earth's surface appears to be. Recent investigations by European men of science are regarded as showing that the crust of the earth bends even under the weight of the air, so that the land over large areas sinks when the density of the air above it is materially increased. The tides also bend the earth's crust under their weight. Such facts give a new significance to the shakings of the earth felt in non volcanic regions, like those at St. Louis some days ago, and the shock at Montreal on Tuesday morning.

Photographing Missiles.—M. Marey, a French experimenter, has been turning his attention to the photography of the curved path of a missile. In order to do this, it was necessary to light the body vividly and move it in front of a black screen; a very sensitive photographic plate being employed to catch the image in all positions of the body. By this means M. Marey was enabled to obtain the double parabola described by a small stone thrown by himself, and first rendered vivid by being wrapped in white paper. He also obtained the circle described by a white stone swung round like a sling, both while he stood still and while he himself moved. He also took a black stick with a white ball at the end, and wrote his name with it in the air before the screen. The name appeared written in the photograph. M. Marey has also succeeded in indicating the speed which the moving body possesses at each instant. To do this, it is necessary at short and equal intervals to produce intermittences in the arrival of the light at the interior of the camera. These intermittences appear on the photograph as interruptions of the curve, and the latter has a dot or dash form, according as the speed of the body is low or high.

A New Elevator.—A new elevator has just been patented which is likely to prove the first of a series of similar ones, as it presents certain elements of safety which are wanting in those of the ordinary kind. The essential peculiarity of the new elevator is that the car or platform carries its hoisting machinery with it, in the shape of a small electric motor placed on top of the car, and arranged to drive two vertical endless screws at the diagonal corners of the platform, which are geared into ratchets, or rather sections of corresponding hollow screws, secured to the posts which form the guides. The current is conveyed to the motor by a flexible insulated wire, which coils and uncoils on the top of the car as it ascends or descends. The great advantage which a screw elevator presents over all other kinds lies in the impossibility of its becoming detached from its supports. Even the breaking of several teeth of the ratchet will not release the screw, and nothing short of the complete disconnection of this from the frame of the car will allow the load to descend.

New Air Engine.—A new air engine has been introduced in England with some features not generally found in such engines. The air cylinder is placed outside the casing, offering great facilities for cleansing and lubricating, also for examining the different parts. This cylinder is fitted with a metallic piston, and the shape of the cylinder enables this engine to be made as compact as possible. The action of the engine is as follows: After the fire is made the retort becomes heated to a dull red heat. This rise of temperature expands the small amount of air inside, which then forces the piston in the air cylinder downwards. After this expanded air has done duty, the displacer, which is actuated from the crank, forces the air which has been condensed against the cold sides of the top part of the cylinder back to the hot end of the retort. As the piston performs its stroke, due to the expanded air in the cylinder, a small air valve is kept closed by the pressure, but as the piston makes the return stroke a small valve on the top of the cylinder opens for a sufficient length of time to permit air to enter the cylinder to replace any which has been permitted to escape through any defect in packing; so that it will be seen that not only is it automatic in receiving the supply of air for expansion, but also in its lubrication, for whenever this down stroke is made a small amount of oil is drawn into the cylinder for lubricating the metallic piston. The manufacturers claim that the design admits of the engine being made much cheaper, as well as affording facilities for examining, lubricating, and repairing.

Hammers.

To most persons a hammer is simply a hammer, but every mechanic knows that that there is a great variety of hammers, from the tiny lump of steel with which the watchmaker taps the mandril of a balance wheel to the huge trip hammer under which tons of hot iron are moulded into shape. The hammer, in fact, plays an important part in mechanic arts, each one presenting its peculiar form, size, weight and material. In some trades there is great skill and dexterity required in the use of the hammer. Any one who has seen the operation of riveting a boiler has admired the sleight of hand with which the strikers round up the head of a rivet in less time than it takes to write about it. The blows follow one another with wonderful accuracy and rapidity, and when the rivet head is finished it looks as smooth and regular as if it had been cast in a burnished mould. Take even the process of driving an ordinary nail and it is remarkable what a difference there is in the method of a novice and that of a carpenter. The one hits one side, often bends or breaks the nail or bruises the finger that holds it. The carpenter hits with precision and drives the nail home with well-directed blows. The deft hammering of copper-smiths is proverbial, pounding metal into any required shape. The copper plates that are used by engravers are hammered hard in long strips by the use of large steel hammers with faces as smooth as that of a mirror. The most accurate hitting is required in this process, because the hammer face is flat and must be held perfectly level to avoid cutting deep gashes in the plates, a skilled workman will make a bevel with a hammer in a few minutes that would require hours if made by filing and polishing. Silversmiths learn to be very expert in the use of the hammer. Spectacle makers can take the temples of a pair of ladies' spectacles and temper them by dexterous planishing between hammer and anvil A blacksmith always has an assortment of hammers with which to shape the ductile iron. File cutters are required to use hammers with great judgment. Each tooth in a hand-made file is made by the burr raised by tapping a sharp chisel held to the soft file. After each blow the chisel is set up against the burr of the last stroke and another burr is raised, and so on until the file is finished. The force of the blow measures the size of the burr raised, so that the regularity of the file depends upon the evenness of the hammer-stroke. Many files are made by transferring processes by machinery, but the hand-made files command the highest price, while with many peculiar forms of files the hand-work is indispensable, and the regularity of hammer work a necessity. One of the most difficult jobs to be done with a hammer is to straighten large flat plates of metal. An expert workman will here do, with a few strokes of the hammer, properly directed, work that a non-expert cannot do at all. Indeed, without great skill the attempt to straighten plates with a hammer generally results in making the crookedness worse. The goldbeaters' hammer is wielded day by day by the trained hand, although one hour of it would fatigue the novice. The caulker has a peculiar long hammer. The axe and the adze are but sharpened hammers. Machinists use great copper hammers for work where they wish to strike blows without marring the object struck.

Among the queerest hammers in use is a magnetic hammer. There was once a Yankee peddler who used one of these to great advantage. He was peddling a fancy soap. He would go into a store, pull out his advertising card, "Buy my unequaled soap," and before the astonished storekeeper could remonstrate he would tack up one of his cards on a rafter or wall where it could not be taken down without a stepladder. The way he did it was to hold up his card to the required spot with one outstretched arm, standing on tiptoe. He had a magnetized hammer with a long handle and in his mouth a few tacks. He put one tack on the hammer, point outward, and with one tap sunk it into the required place to secure his card out of reach. Recently in Brooklyn, N. Y., a tall bill poster pursued this plan of posting advertisement cards on telegraph poles so high that it required the line men to climb up the poles to get the cards down.

FOREIGN CORRESPONDENCE.

ENGLAND.

Wolverhampton, October 7.

The action of the colliers and ironworkers, who have given notice for advanced wages, has caused some uneasiness, but the feeling generally appears to be that their claims cannot be sustained. The employers would willingly advance both wages and the selling price of iron, but they foresee that the market is not sufficiently strong to sustain advanced quotations. Under existing circumstances both colliers and ironworkers have plenty of work, and are able to support themselves and their families. If prices are advanced (as they must be, if the men's demands are complied with) much of the trade which has been attracted to this country by the low prices ruling, will be diverted to the works of continental competitors, where long hours and low wages are universal. If the present state of the market continues, it is not anticipated that there will be any official change at quarter day in the prices of the various classes of iron. On the Glasgow Exchange there has been a very strong market, and the value of G. M. B. warrants has advanced 1s. 6d., to 51s. 10d. per ton. Makers have advanced their quotations for No. 1 iron from 1s. to 3s. per ton. The improved demand for both G. M. B. and makers' iron has contributed to the advance, and the market is also strengthened by speculative buying. The stock this morning was 626,316 tons, a decrease this week of 1,186 tons. The Middlesborough market has for several weeks been firm, but has been adversely influenced by the dullness in Glasgow. Steam freights to America are again stiffening, owing to the scarcity of return freight. There is a steadily sustained demand for finished iron, but at present the manufacturers are disposed to foster the trade by the continuance of low prices, rather than run the risk of checking the demand by advancing their list quotations. Looking at the cost of fuel, pig iron and wages, the producers of finished iron can have but a very small margin of profit, and while they are realizing such little return for their capital and energies, the men should be content to do their part in the battle against continental competition. Prices of steel show no change. No. 1 Bessemer is still quoted ae 59s. per ton at works net; No. 2, 58s., and No. 3 forge 56s. 6d. per ton. Steel rails are in brisk request, and heavy shipments are being made. The tin trade is active and prices firm. The Cleveland iron makers have determined to continue to restrict production.

Knives and Forks.

While the finest and most expensive cutlery is still imported from Sheffield and other centers of English manufacture, an immense trade in domestic cutlery has sprung up, and American knives are found on many European tables. There are various reasons for this, foremost among them the fact that in this country machinery enters more largely into the manufacture of cutlery than in England, where the finest steel blades are forged, ground and polished by hand, each blade receiving a share of minute and individual attention which is impossible where hundreds are turned out at one time. This individual manipulation enables a workman to detect the very smallest irregularity in the warp of the steel, and to bestow upon each separate piece that passes through his hands the amount of care that is necessary to bring it to the very highest state of perfection.

The expense of a knife depends very greatly upon the handle, in first-class goods almost entirely so, the same quality of steel being invariably used for the blades, and the price of imported cutlery has increased largely within the last few years on this account. The handles of the best English knives are invariably made of ivory, and in this article there has been a formidable advance of no less than from $300 to $400 per ton, and there is prospect of a still further rise in price. Besides celluloid various materials are pressed into the service by American ingenuity. Cheap knives have handles of coca bola wood which is imported from the isthmus, and in spite of the difficulty of transport is very much cheaper than bone. Then we have the ebony handles, the material for which is imported from Zanzibar, carried from the interior of Africa upon the backs of natives and shipped in immense quantities to America. Rubber handles again play an important part, the royalty upon the patent, which is an old German one and has now lapsed, having amounted to $40,000 a year. Many varieties of bone, too, are used, and horn is still in demand for the handles of carving knives and forks. An immense trade is done in the solid steel knives of which handle and blade are made in one piece. These, which are of British manufacture, are imported here and plated for the American market. Plated table cutlery, as we have seen, is popular here, and immense quantities of it are shipped to the Southern States. The appearence of American cutlery is much in its favor. In the cheaper knives metal is used in the handles, and serves both as ornaments and rivets, and great attention is paid to the shape both of handle and blade. Some of the more expensive knives and plated forks have pearl handles, curiously cut and twisted. The pearl itself is imported from India and Manila and cut in New York city where pearl cutting forms a distinct branch of trade. Carving-knives are grooved and curved, pointed and improved in various ways; very often they have the stag-horn handles, especially those for the Southern trade, and in carving forks there is a recent improvement, which is of great value, in the shape of a guard, which constitutes a rest when pushed back, and when up is far safer for the carver than the old-fashioned guard. Butter-knives and cheese-scoops have all received attention from the modern manufacturer; so, too, have carving-knives. The American carving-knife in now taking the precedence of all but the most expensive ones, and travellers in Europe protest that they have met with none there that could compare for finish and that desirable qualification, 'edge,' with those which have recently been perfected by the leading cutlery manufacturers of this country.

The steel forks in use by our great-grand-parents were unwieldy contrivances, generally only two-pronged, like the modern carving-fork, and many such may still be seen in the country districts in England. The black-handled knife and fork in the kitchens of modern houses bear a family likeness to them, but the last fifty years have witnessed such improvements in this branch of manufacture that the poorest laborer to-day posseses a knife which would have been looked upon as a marvel of workmanship early in the century.

In modern homes the bright, glittering steel fork has long since largely given place to the plated or silver one, and within the last few years plated knives have largely usurped the place of unplated steel, and, in spite of one or two obvious objections to them, they appear to be rapidly gaining in favor. Foremost among these objections is the bluntness of plated knives, even if the blade beneath the plating is made of the best tempered steel; and then, unless very heavily plated, the silver wears off and the knife loses much of its beauty.

Wanted an Understanding.

An Illinois merchant who was taking baking powder in bulk from a Chicago firm, called at headquarters the other day to say that there was something wrong with the goods.

"I don't think so," was the reply; "we make the best article sold in the West."

"I think we ought to have a more perfect understanding," continued the dealer. "Now, then, you adulterate before you send to me, then I adulterate before I ship, then the retailer adulterates before he sells, and the consumer can't be blamed for growling. I wanted to see if we could'nt agree on some schedule to be followed."

"What do you mean?"

"Why, suppose you put in ten per cent, of chalk, then I put in twenty per cent. of whiting, then the retailer puts in thirty per cent. of flour; that gives the consumer forty per cent. of baking powder, and unless he's a born hog he'll be perfectly satisfied. You see, if you adulterate fifty per cent. on the start, and I adulterate as much more, and the retailer as much as both together, it's mighty hard for the consumer to tell whether he's investing in baking powder or putty; we must give him something for his money if it's only chalk.

Ohio Agricultural Returns.—Mr. Chamberlain, the Ohio statistical agent of the United States Department of Agriculture, has sent the following estimates to Washington, based on returns from all the counties of Ohio; Total number of bushels of wheat, 45,787,811; rye, 406,151; oats, 18,435,779; barley, 1,337,309; corn, (probable), 87,005,280; potatoes, (probable) 89,000,000. Per cent. of an average crop: Sweet potatoes, 100; tobacco, 74; sorghum, 92; corn, 87; potatoes, 101. Yield per acre, in bushels: Wheat, 16.7; rye, 15.8; oats, 28; barley, 19.9. The weather is damp and hot, so that much of the corn considered hopeless a month ago is now rapidly hardening. The average crops of Ohio for a period of ten years are about as follows: Wheat (average of five years), 40,000,000 bushels; corn, 100,000,000; rye, 420,000; barley, 1,280,000; potatoes, 8,754,000; tobacco, 276,000,000 pounds.

Fusion of Metals.—Metals change their volume at the moment of fusion. Hitherto it has been considered, as a rule, that fusion is accompanied with expansion, and that, therefore, the density of metals in a solid state is greater than in a liquid state, except in cases where the pieces float on the surface, like ice and water. Messrs. Nies and Wurkelmann of the Academy of Munich, have been experimenting with various metals with the following results: In the case of tin, by keeping it at the melting point (266.5 degrees) for a considerable time, it is found to float on the surface. The results with lead and cadmium were not so striking. Zinc is like lead, it expands two per cent. atthe moment of solidification. The same result though more characteristic, was arrived at with bismuth, which has a density of three per cent. stronger in a liquid state than solid. Copper and iron also expand at the moment they solidify. This phenomenon is peculiar to all metals which crystallize when they solidify.

Steam Press for Forming Axes.—The large steam hammer or press at the Beatty Axe Works, Chester, Pa., A. B. Black proprietor, is an immense piece of machinery, weighing thirteen tons, and capable of making a hatchet, adz or broad-axe in a remarkably short space of time. Dies are used according to the shape of the tool desired. In these dies a piece of iron of the proper weight is put, and by intense pressure the iron is reduced to the desired shape. By an ingenious arrangement the iron is "steeled," that is, the required piece of steel is welded to it by pressure from four directions. It is again placed in the die and repressed and the "eye" punched. A man then takes it, points it, and dresses it up for the market. This machine is expected to turn out twenty-four dozen hatchets per day, and a man could not make more than ten dozen in a week's work. It is also used for cutting iron, in which it is the means of saving much labor. A heavy knife is put upon the machine and it will make a clean cut through a piece of cold iron $2\frac{1}{4}$ by $1\frac{1}{2}$ inches. There is no other press in this country like this one.

Protection of Vessel Hulls From Fouling—The question of the preservation of iron and steel vessels from fouling and corrosion incident to sea voyages, appears to have been solved to some extent by the following process of sheathing iron ships with zinc, proposed some time since by Mr. J. J. Atkinson, of Brackley, England. The hull of the vessel is fitted with thin sheets of zinc, attached by means of solder first to spots prepared by an electro-dynamo machine on the shell of the vessel, and then over the same spots when the sheathing has been fited. Holes are perforated in the sheathing a little less than the diameter of, but made to correspond with, the prepared spots on the shell, which are spaced every way about 8 or 9 inches apart, and the application of solder, after the sheathing has been fitted, results in the fusion of the outer and inner layers of solder, and, consequently, the zinc sheathing between. The landing edges and laps of the several strakes of zinc plates are soldered throughout, the whole presenting a surface smoother than the most carefully sheathed wooden ship.

REVIEWS.

Demorest's Monthly Magazine for November. New York: 17 East 14th Street.

This magazine is a marvel of literary and artistic excellence. It has a superb oil picture, "The Fruits of Italy," and a full page engraving of a fisher boy. The first story is "Cousin Caleb's Thanksgiving," and throughout it is replete with interesting and instructive articles suited to the household, and which are lavishly illustrated. The coming fashions in dress afford an ample portrayal of all descriptions of ladies' costumes.

The Vibration of Manufacturing Buildings.—The synchronous vibrating of a mill can be observed in many instances where the machinery, soon after starting, shakes the mill before reaching full speed, and the building becomes steady again after the velocity of the machinery reaches a certain limit. The most practical method in many instances, however, is to change the key-note of the building by some alteration of the condition of vibration—by putting in columns under the centers of vibration, and by putting braces near the tops of columns, extending out to the ceiling. The power requiredto vibrate a mill, bending the floors, walls and machinery to and fro, is generally under-estimated.

Thumb Latches.—The inventor Blake, having been unsucceessful in business concluded to turn his attention to invention, and going to a hardware store asked the salesman to show him the worst made article of common use. The salesman handed him a Norfolk door-latch. Blake bought it, took it home, and in a short time perfected the Blake thumb-latch. The first year thirty thousand dozen were sold. The Blake latch was patented in 1830 and is used now. The last old Norfolk latches that we have account of were worked up in a Philadelphia rolling mill in 1845.

Swiss Watches—No other industry in the world has such a fixed system for regulating its work as the Swiss watch manufacturers. About sixty different masters are occupied with the manufacture of the different parts of each single watch, in such a way that each workman manufactures, throughout the year, the same pieces, as, for example, the hands, or certain wheels, etc.; and by this means the workmen attain a peculiar ability in their special branch. In a like manner they have metamorphosed their simple and almost primitive tools into most complicated machinery, and their ability to perform work is enormous, both as to quality and quantity. They work generally at home, with the help of members of their family, and then sell the finished component parts to the big manufacturers, under whose superintendence the watch is completed. Although these different parts are procured from different shops, they nevertheless exactly fit together, because they are made after one and the same number, measure, and rule. The workmen earn 5 francs, 15 centimes per day, according to the branch they are engaged in and to the run of the business; and in nearly every house of the region where watches are made may be found a special working shop. Large manufactories are not frequent; the largest are employed in preparing the rougher metal works, such as the turning of the screws, &c. The Swiss watch industry occupies at present about 70,000 persons.

MARKETS.

Office of TRADE REVIEW AND WESTERN MACHINIST.

FRIDAY EVENING, October 20.

FINANCIAL.

The tone of the money market is easy and rates are 7 to 8 in bank and outside for prime paper. On prime collaterals money is obtained at 6 per cent. on specific time and 5 per cent. on call. There has been an unusually large demand for eastern exchange and the market is very strong at par buying, and 1-20 per cent. premium selling. The market for Sterling exchange is somewhat easier, but closes steady; prime local bankers' three days' sight selling at 486, and sixty-day bills at 481½. Dealers buy commercial bills at 479 per £. Local Securities have been in good request and firm, but the market is quiet at the close.

IRON.

Lake Superior ore is somewhat more active; prices are steady. There is a steady absorption of American pig iron, and standard brands are closely sold up. Prices for other brands are slightly in buyers' favor Sales made are chiefly in small lots. There have been but moderate arrivals of foreign pig; prices rule firm. For spot we quote: Eglinton, $23@23.50; Glengarnock, $25 @25.50; and Gartsherrie, $25@25.50. Bessemer pig has been disposed of at $24 50. Rail mills are well supplied with orders. For steel rails quotations are $47.50@50 per ton. Few sales of iron rails are reported; agents' quotations continue at $45 to $48 per ton at mill, according to section. Large orders for late delivery have been placed at $42.50. For scrap the demand is moderate and prices are firmly held. There is a satisfactory business doing in structural iron. Tank iron is gradually weakening, and the amount of business is light. Reports from the oil regions show that the rush is over, and that the facilities for storing oil are about equal to all probable requirements. The mills are, however, pretty well off for the rest of the year, and no special weakness is likely to be developed before December. The local demand for Shell and Flange iron is active, and prices are shaded for delivery in November.

CINCINNATI.—Reported by Rogers, Brown & Co. The week has been quiet in iron circles. Buyers think the tendency of the market is in their favor and defer purchases. Prices, in consequence, are taking a slightly lower range. There are no stocks pressing, however, and furnacemen think the underlying conditions favorable for a strong market. There are few more furnaces in blast than last year; there is a full consumption, same as then, except in car-building; stocks in buyers' hands are not large; foreign iron is not competing; there is less of it every day abroad and almost none here. American stocks are very meagre except charcoal irons and a few furnaces tributary to Pittsburgh. Money is fairly plentiful and crops unusually large; credit is sound, the stock market lower and healthier, making panics less likely, emigration active, currency laws settled, Congress out of the way, and food products getting cheap. Iron makers cannot see why prices should not be higher. Cincinnati mills are running again, their difficulties having been adjusted by President Jarrett's visit. Following are cash quotations, carefully revised: Hot Blast Foundry.—Hanging Rock, C. C., No. 1, $26.50 @ $27.00; Hanging Rock, C.C., No. 2, $24.50@$25.50; Southern No. 1, $24.50@$25.50; Strong Coke No. 1, $23.00@$24;00; Strong Coke No. 2, $22.00@$23.00; Strong Coke No. 3, $21.00@$22.00; Soft Stone Coal No. 1, $22.50@23.00; Soft Stone Coal No. 2, $21.00@$22.00; Forge—Strong Neutral No. 1 Mill, $21 00@$21.50; Cold Short No. 1 Mill, $20.00@$21.00. Car Wheel and Malleable — Hanging Rock C. B., $31@$33; Hanging Rock W. B., $25@$27; Southern Car Wheel Iron, $31@$33; Lake Superior Car Wheel Iron, $28@$30; Lake Superior Malleable, $28@30.

CINCINNATI—Reported by E. L. Harper & Co. —The market during the week has been heavy. The mail orders have been confined chiefly to car lots. The supply is not largely in advance of the demand, and while concessions are being made for round lots, the balance is so equally poised, that a few liberal orders would check the weakening tendency of the market, and crystalize prices to the figures given as prices current. The conservative and shrewd movements of the large consumers of Mill Irons serve to keep the demand in harmony with production, and no scarcity of metal is felt, and in consequence, no appreciation of value is realized.

COPPER.

The market is quiet and steady. Sales of Lake have been made at 18½c. cash; Baltimore, at 17⅝; Anchor brand at 17¾. Sales of Arizona have taken place at 17¾. The London market is firm; Chili bars are quoted at London at £71 4s.; Best Selected is proportionately higher.

LEAD.

There has been only a moderate activity in lead. Common Domestic has sold at $5@5.15; Refined is nominally quoted at $5. St. Louis quotes Hard and Soft indiscriminately at 4¾c. In Europe the market is quiet and dull. There is no change in manufactures. We quote: Pipe, 7½c.; Sheet, 8c.; Tin-Lined Pipe, 15c., and Block 45c.; all les 10 per cent. to the trade.

TIN AND TIN PLATES.

Prices of tin show weakness. Stock in this country is estimated at 2,000 tons. We quote at the close, large lines, Straits, 24¼c.@25c., and Lamb and Flag, 24⅛c.@24¾c. In tin plates there has been a good jobbing trade, particularly on Charcoal tin; Cokes are somewhat weaker.

SPELTER AND ZINC.

The demand for spelter continues light, the market ruling dull. Consumers supply their requirements at 5.45 to 5.55 for both Domestic and Foreign brands. There has been a fair jobbing demand for Foreign and Domestic Sheet Zinc from store at 6⅞ to 6 cents.

HARDWARE.

Trade is fair. There is a good demand for blacksmiths' and wagon makers' supplies, tools, barb wire and similar goods. The nail mills are running full, many of them double turn, and with the active demand, prices for 10d. to 60d. continue at $4. There is an active movement in locks, knobs, butts, sash weights, and fixtures, bolts and other articles of hardware.

LUMBER.

Some of our yard dealers report an improvement in trade. The holding back of farmers in selling their grain has exerted an injurious influence on business. It is generally conceded that bottom prices have been reached. The remaining fall trade is likely to make heavy inroads upon stocks. With the present and prospective demand it is possible that many descriptions of stock will not be sufficient for supply in the six months intervening before summer.

WOOL.

Manufacturers continue to buy largely. In sales of domestic fleeces in the Eastern markets Ohio XX and above have brought 44c.

LUMBER.

PLANK. MIXED WIDTHS.
2 inch, 12, 14 and 16 feet, together.

A 1 and 2 uppers	$50
A 3	40
B	32
C	20
D	14
E	12

1¼ and 1½ inch.

A 1 and 2 uppers	$48
A 3	40
B select	32
C	20
D	15
E	13

BOARDS.
One Inch, mixed widths.

A 1 and 2 uppers	$44
A 3	36
B select	30
C	19
D	14
E	12

STOCK BOARDS.
12 Inches wide.

A 1 and 2 uppers	$45
A 3	38
B	32
C	21
D	16
E	13

STRIPS.
6 Inches wide.

A 1, 2, and 3	$42
B	32
C	22
D	16
E	12
Norway Fencing Strips	17
Norway Flooring Strips	25

WORKED LUMBER
FLOORING.

Flooring—A 3	$42
B	35
C	24
D	20
Norway Flooring—A 3	28
C	22
D	18
Matched Drop Siding, 6 inches—A 3	42
B	38
C	24
D	20

Beaded Ceiling $2 higher than Flooring.

One half inch Bevel Siding—A 1 and 2	24
A 3	20
B	18
Ash Flooring—A 1 and 2	40

BILL STUFF.

Small, joists, 12, 14 and 16 feet	$14
Timber, longer than 20 feet and over 4 00@$6 00 less than length.	
Cedar Posts, large	30 00
" " medium	25 00
" " small	$15 to 20 00

SHINGLES, LATH AND MILL WORK

Shingles XXX	$ 4 25
Clear Butts	3 25
Lath	2 75@3 00

Surfacing, one side, adds $1.25; two sides $1 50
Matching flooring and drop sidings, $2.25.

LAKE FREIGHTS.

COAL.

Buffalo to Chicago	$.62½@.65
Toledo to Chicago	1.00
Cleveland to Chicago	70@75
Erie to Chicago	70@75
Oswego to Chicago	1.50
Fairhaven to Chicago	1.30
Buffalo to Millwaukee	70@75
Cleveland to "	70@75
Erie to Milwaukee	75
Buffalo to Racine	80
Buffalo to Kenosha	85

IRON ORE.

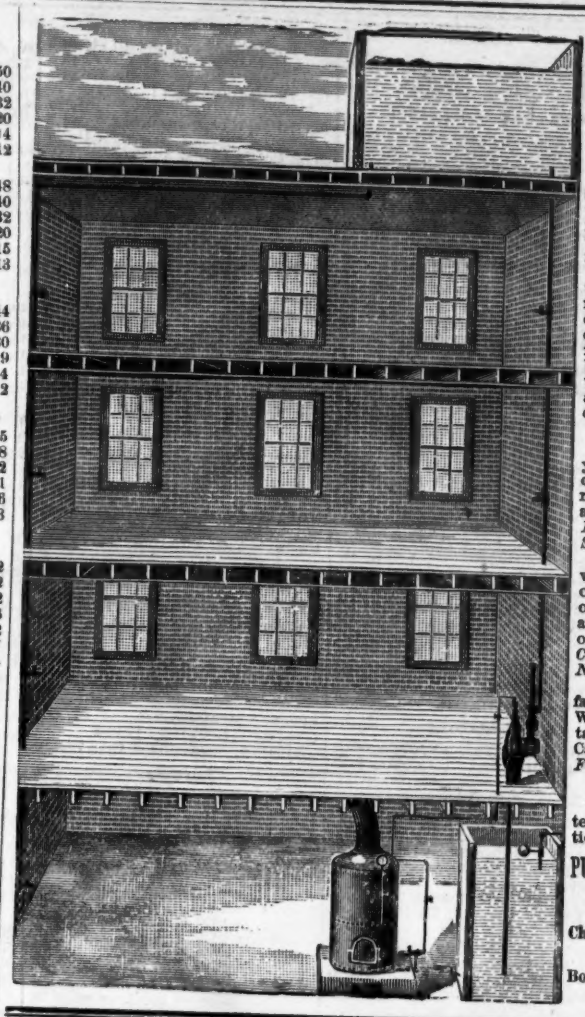
Marquette to Lake Erie ports	1.25
Escanaba to Lake Erie ports	90@95
Escanaba to Chicago	90@95
Marquette to Chicago	1.15@1.20

BI-CENTENNIAL CELEBRATION OF THE LANDIMG OF WILLIAM PENN.

The two hundredth anniversary of the landing of William Penn, will be celebrated at Philadelphia, by a grand carnival and series of gorgeous pageants during four days, Oct. 24th, 25th, 26th and 27th, 1882.

The street parades and ceremonies incident to this demonstration, will be conducted on a scale of grandeur and magnificence never before attempted upon the continent. All the religious, benevolent, social, literary, civic, military and naval organizations will participate in the daylight parades, and at night there will be splendid processions of allegorical tableaux and displays of fire works, representing scenes in the history of Pennsylvania, and illustrating one of the great epic poems of India, "The Ramayana." To accommodate all persons desiring to witness or take part in these imposing ceremonies, the Pennsylvnia Company will sell excursion tickets at greatly reduced rates from all stations. Tickets will be good going east on any regular train Oct. 23rd, 1882, and available for continuous return passage, leaving Philadelphia not later than Oct. 28th.

No pleasanter time could be chosen for a trip to Philadelphia. The views along the line of the Pennsylvania Railroad are famed the world over, and the Allegheny mountains at this season of the year are clothed with a leafy robe of gold and crimson glory, which seen through the hazy atmosphere of Autumn, presents visions of beauty to be found upon no other railroad line in America. Riding in luxuriously upholstered cars over a superb roadway, and through scenery approached in loveliness only in enchanted dreams of Fairyland, travel is robbed of fatigue, and the tourist stores his mind with recollections that will prove a well spring of pleasure for all time to come,



THE NEW
PULSOMETER
Filling Tanks on Buildings.

We show the New Pulsometer as arranged in buildings, for pumping water from tank in cellar, supplied from main or artesian wells, to a tank on the roof, for use in case of fire and other purposes.

The pipe leading down from upper tank has hose connections on each floor, from which a hose should be connected and ready to run out to extinguish a fire within a few seconds from time of discovery, and long before an alarm could be made to the department. Hose connections are also made from discharge pipe of pump on the upper floors.

"We have used a No. 5 for several years, for pumping water from our cellar to a 4,000 gallon tank, on the roof of our five-story building. It has always given entire satisfaction."—*Empire Steam Laundry, 75 & 77 King Street, New York.*

"I am using a No. 2 for pumping water from our cellar to a large tank on the roof, for supplying water to our buildings, 80 feet vertical, and am much pleased with the working of it."—*Robert Gair, 161 and 163 Chambers Street, and 143 Reade Street, New York.*

"A No. 3 gives us complete satisfaction, far beyond our expectations. We use it for pumping water into tanks, for supplying steamboats. Can cheerfully recommend it."—*H. Fordham & Son, Greenpoint, L. I., N. Y.*

Descriptive book with prices and testimonials mailed upon application to

PULSOMETER STEAM PUMP CO.,
83 John Street, N. Y.,
OR TO
Chicago Office, 193 Lake Street,
FRANK GRAY, Manager.
Boston Office, 82 Charlestown St.,
S. B. EVERETT, Manager.

COATES'
"Independent Lock Lever"

HAY AND GRAIN RAKE.

Patented August, 1867, January, 1875, June, 1875, and November, 1878. 60,000 now in use. Light touch of lever and driver's weight dumps it. Best self-dump in market. Twenty steel teeth. No complicated ratchet wheels, friction bands or other horse machinery needed to operate it. A small boy rakes easily twenty acres per day with the Coates' Lock Lever. Send for circulars.
A. W. COATES & CO.
Alliance, Ohio.

THE MORGAN
Variable Blast Water Tuyere Iron.

With the front plate removed, showing the rotating air tubes through which four different currents of air may be passed thereby making any sized fire from two to eighteen in. diameter.

It actually saves one-half of the coal; makes an intense heat just where it is needed, and burns no coal unnecessarily. Always gives a centre blast, and cleans all the dirt from the fire. Supplies hot water. We also furnish a Tuyere on same principle without Water Attachment. All goods guaranteed to please or no sale. Catalogue sent free.
Address, A. W. MORGAN & CO.
52 Vance Block, Indianapolis, Ind.

SAFETY STEAM, WATER & HAND POWER ELEVATORS.
GIVE HATCH SIZE & ELEVATION OF BUILDING, & SEND FOR ILLUSTRATED CIRCULAR
C. H. MITCHELL & CO.
105 MICHIGAN ST. CHICAGO

PURE PREMIUM BONE.

The tried and never failing Fertilizer in all grains and grass crops. It has proved its value as such by years of actual use all over the world. Circulars and Price List free. Address all letters pertaining to the purchase of Premium Bone, or the sale of bones. to **Excelsior Fertilizer Works** Salem Columbiana County Ohio.

HEALTH A physician's gift to the debilitated—"Treatise on Cause and Cure of Nervous Debility" sent on receipt of two 3-cent stamps. Address Dr. CLEGG, CLEVELAND, O

Dayton Gauge Works

Patented Feb. 5, 1878.
O. W. BAYLEY Prop.
Manufacturer of the
Bourdon and Ashcroft Gauge,
ALSO, BAYLEY'S
IMPROVED DUPLEX GAUGE,
Specially adapted for Locomotives.
32 North Jefferson Street,
DAYTON, OHIO.
All kinds of Gauges repaired at short notice.

Cleveland Wholesale Prices.

HARDWARE.

Adzes.

Carpenter's.....per doz $18 40
Ship..... " " 18 75
Heavy railroad.... " " 19 50

Axes.

Hunt's.....₰ doz $ 9 50
Lippincott's Crown ₰ doz 9 00
Cut More ₰ doz 9 00
Peck's Double Bit ₰ doz 22 00
" Champion Blade ₰ doz 11 00

Anvils.

Eagle, Amer...per lb. 10c dis 20
Wright's..... 10¼c@11c
Armitage's Mouse Hole 9¼@9¾c
Trenton..... 10¾c
Wilkinson's..... 10¼c

Anvil Vise and Drill.

Millers Falls Co. $28.....dis 20
Cheney Anvil and Vise.dis 25&2

Vises.

Solid Box, list of July 1, '79, dis 35
Solid "Crown" (A. H. Hildick).....40 to 100 lb, 15c net
Solid, Peter Wright's.....15½
Solid, Wilkinson's.....13½
Parallel, Parker's.....dis 40
Saw Filers, Hopkins' ₰ doz $17.50, dis 10
Reading.....dis 45&10
Cowell Hand Vises.....dis 20
Richardson's Vise and Anvil.....dis 25

Augurs and Bits.

C S cut augers.....dis 40&10
do do do bits.....40&10
D C gimlet do Ives....dis 50
Snells bits.....dis 40
Russell Jennings' augers dis 16⅔ &10&10
Cook's pat augur.....40&10

Animal Pokers.

Berea, per doz.....4 00
Eagle, per doz.....6 00

Apple Parers.

Domestic & Reading ₰ doz.$7 50
Turn Table.....00

Bolts.

Machine.....dis 60
Bolt ends.....dis 60
Plow.....dis 50
Plow, R. B. & W.....dis 40
Cast Iron Barrel Shutter, etc.....dis 50 &10
Cast Iron Chain (Sargent' list).....dis 60&10
Ives' Pat. Door Bolts..dis 50
Wrought Barrel.....dis 55&10
Wrought Square.....dis 55&10
Wr'g't Shut'r, all iron, Stanley's list.....dis 50&10
Tire, R. B. & W., new list.....dis 70&10
Stove, American Screw Co.'s.....dis 40
Bolt Ends.....dis 60

Bellows. Dis

Blacksmith's com new list, 45 ₰ ct
Moulder's new list, dis 25 ₰ cent
Hand, new list, 25 per cent

Butts. Dis

Wrought brass.....65&10
Cast, loose joint.....55
Pin, loose.....50
Wrought, fast joint narrow.....45
Wrought fast joint broad.....45
Wrought loose joint broad.....55
Wrought table and back flaps.....45
Loose joint, without acorns.....55
Ten per cent. extra dis for cash.

Cleveland Stamped Elbows

Genuine Russia Iron

4 inch per doz.....4 50
4½ do do.....5 50
5 do do.....7 50
5½ do do.....8 50
6 do do.....9 50
do do.....11 00

Planished American Russia Iron

inch, per doz.....4 00
4½ do do.....5 00
5 do do.....6 50
5½ do do.....7 50
6 do do.....8 50
do do.....9 50

Charcoal Iron

4 inch, per doz.....2 00
4½ do do.....2 50
5 do do.....3 50
5½ do do.....4 00
do do.....4 50
do do.....5 50
25 per cent

Chisels.

Hot and cold cutting.....₰ lb 30
Railroad track.....30
Machinists.....30
Mallet head.....50
Tape.....50
Packing.....50
Stone cutters.....50

Crowbars.

Cast steel.....₰ lb 8¼
Iron, steel points.....6¼c

Cutlery, Pocket and Table.

Meriden Cutlery Co, table..net
Am. Miller Bros.' Cutlery Co.....dis 25
Humason & Beckley, pocket 83⅓
Naugatuck Cutlery Co...list net
Aaron Berkenshaw's pocket dis 25

Coopers' Tools.

Bradley's.....dis 10&20
Barton's.....dis 20

Chains.

Coil by cask.....

3-16	¼	5-16	⅜	7-16	½
10¾	9	8	7	6¾	6¼

Drills and Drill Stocks.

Blacksmiths', each...$2.50 dis 10
Blacksmiths', self-feeding, each 7.50 dis 20
Breast, P. S. & W.....dis 20&10

Drawing Knives.

Witherby's.....dis 65@10
Nobles Mfgr. Co.....15
Adjustable handle.....20

Emery and Emery Paper.

Regular Numbers.....₰ lb 6c
Flour and F. F.....₰ lb 4c
B. & A. Emery Paper..dis 30&5

Enameled and Tinned Ware.

Kettles.....dis 50
Sauce Pans.....dis 25
Tinned Sauce Pans.....dis 50

Files.

Auburn $5 to £..dis 35 pr cent
E. M. Boynton's, new list dis 25
J. & Riley Carr.....4.50 to £.
Johnson & Bro.....dis 30
Butcher's.....4.50 to £.
Walter Spencer & Co.'s "Diamond".....4.50 to £.
Fisher's.....4.75 to £.
Moss & Gamble.....4.50 to £.
H. Disston & Sons (new list).....dis 40 per cent
Heller Bros.' Horse Rasps dis 25
Nicholson.....dis 40
New American.....dis 40
Union File Co.....dis 40

Grindstones.

Ohio.....1¼@1½ ₰ lb
Nova Scotia.....1¼@1¾ ₰ lb

Hammers.

Maydole's.....dis 15
Cheney's.....dis 25
Hartford Hammer Co.....dis 20
Humason & Beckley.....dis 50
Verree.....dis 5
Magnetic Tack, Nos. 1, 2, 3, $1.25, $1.50 and $1.75, dis 25&10
Nelson Tool Works....dis 40&10
Warner & Noble's.....dis 5
Kip's.....dis 15
Yerkes & Plumb.....dis 15
Wilkinson's Smiths' 11½c ₰ lb net

Hatchets.

Yerkes & Plumb:--Shingling, Nos...1, 2, 3,
₰ doz $7 50, $8 00, $8 50, dis 25
Claw, Nos...1, 2, 3,
₰ doz $8 25, $8 75, $9 25, dis 25
Lathing, Nos...1, 2, 3,
₰ doz $7 50, $8 00, $8 50, dis 25

Nails.

10 to 60d.....$4 00
8 and 9d.....25
6 and 7d.....50
4 and 5d.....75
3d.....1 50
2d.....2 75
3d fine.....3 00
2d fine.....3 75
¾ inch.....3 00
4d barrel.....1 00
1¼ inch barrel nails.....1 50
1½ do do do.....1 75
1 do do do.....2 50
¾ do do do.....3 00
Cut spikes, all sizes.....25
Clinch nails, all sizes.....1 75
Casing and box nails 75 cts advance
Finishing nails, $1 25 do
Tobacco nails, 50 cts do

Nuts and Washers

Nuts, square.....7c off list.
Nuts, hexagon.....6c. off list.
Washers.....6c off list.

Picks.

Railroad, 4 to 5 lbs...doz $7 75
5 to 6 lbs.... 7 75
to 7 lbs.... 8 50
7 to 8 lbs.. 9 50
Railroad Tamping Pick 7 to 8 lbs..doz 13 50
Mill Picks per lb.....75c

Rivets.

Iron.....dis 40
Tinned.....dis 40
Copper.....dis 33⅓

Squares. Dis

Steel or iron, case lots.....50
Try squares and T bevels.....40

Spikes—WROUGHT

All lengths by ¼ inch.....4½c
do do do 5-16.....3½
do do do ⅜, 7-16 & ½in 3¼

Shovels and Spades.

Ames' new list, July 1, 1881,.....dis 15
Old Colony.....dis 15
Remington's (Lowman's Patent).....dis 30
Rowland's.....dis 40 and 10
Griffiths.....dis 40&10

Saw Sets.

Boynton's patent X Cut, per doz $12; Hand Saw, per doz $10.....dis 20
Stillman's Genuine, per doz $3 50 and $5 50.....dis 20
Stillman's Imitation, per doz $3 25.....dis 20&10
Common Lever, per doz $2 dis 30&10
Leach's No. 0 $8; No. 1 $15; dis 15
Hammer, Hotchkiss $5 50, dis 10
" Bemis & Call Co.'s new patent.....dis 40&5
Bemis & Call Co.'s Lever and Spring Hammer.dis 30&5
Bemis & Call Co.'s Plate..dis 10
" " Cross-cut dis 12½
Aiken's Genuine..$18, dis 50&10
" Imitation.....$7, dis 50
Hart's Patent Lever.....dis 20
Disston's Circular.....dis 40

Sad Irons.

From 4 to 10 lbs....per lb 3¾ net
Self-Heating.....₰ doz $9 net
" Tailors..₰ doz $18 net
Gleason's Shield and Toilet.....dis 25
Mrs. Pott's Irons, double pointed.....dis 35
Mrs. Pott's Irons, square back.....dis 35
Enterprise Star Irons.....dis 40
Combined Fluter and Sad Iron.....₰ doz $15, dis 15

Scales.

Hatch, Counter, No. 171 ₰ doz. $42, dis 37½&10
Union Platform.....$6, dis 45
Fairbanks'.....dis 20
Buffalo Scale Co.....dis 20&5
Forsyth Scale Co.....dis 25
Howe's.....dis 20&10
Chatillon's Eureka.....dis 25
Family Universal.....dis 50
Scale Beams.....dis 33⅓&10

Bag Holders.

Sprengle's Pat, $18.00 per doz 40 per cent. dis.

Planes.

Ohio Tool Co.....dis 25
Sc ota.....dis 30
Bailey's Pat. Adjstble..dis 20@25

Rules.

Stanley.....dis 66⅔ and 10

Sash Locks. Discount.

Payson Mnfg. Co. "Perfect"..42
Simmons' Sash Supporters...20

Hinges.

Champion double acting spring hinges.....dis. 30
Screw & Strap 8@12 in.....30. net
Gravity Locking Blind Hinges, Sargeant & Co. 70&10

Screws. Dis

Flat head iron or steel per cent dis.....30
Flat head brass.....30
Round head iron or steel..25
Round head brass.....20
Brass and Silver capped..40
Japanned, list of Plain Screws.....20
Coach, patent Gimlet point, list per 100.....60
Lag, taper points.....60
Bed.....10
Machine, flat head, iron..55
round head, iron 50
Bench, iron.....55&10
wood, beech, per doz $3.....10
wood, hickory.....20&10

Valves. Dis.

Jenkins' Patent Gate Valves..35
" " Globe " ..40
" Standard Packing " ..20

Wrenches.

Coe's genuine.....40 & 10
Coe's imitation wrought bar..60
Mechanics'.....60 and 10

Wire.

Brass and Copper.....dis 20
Bright & annealed, Nos. 0 @ 18 dis 50@52½
" " Nos. 19 @ 26 dis 60
" Nos. 27 @ 36 dis 65
Coppered.....Nos. 0 @ 18, dis 45
Galvanized, Nos. 0 @ 18, market list,.....dis 40
Tinned, Nos. 0 @ 18,....dis 40@45
Cast steel.....dis 40
Tinned Broom Wire, Nos. 18 @ 25.....dis 55
Annealed Fence, Nos. 8 and 9.....dis 55@52½
Annealed Grape, Nos. 10 to 14.....dis 52½
Galvanized Telegraph, Nos. 7 to 9.....₰ lb 7½c
Galvanized Telegraph, Nos. 10 to 11.....₰ lb 8¼c
Galvanized Telegraph, No 12.....₰ lb 10½c
Fence staples.....₰ lb 5½@5¾c
Fence Staples, galvanized, ₰ lb 7@7½c
Stubs Steel Wire.....$7 00 to £
Barb Wire, painted.....8½c
Barb Wire, galvanized.....9¼c
Crucible Steel Ropes from ⅜ in. at 9c to 1¼ in. at.....52c
Best Selected Iron Ropes from 3-16 in. at 8c. to 1¼ in. at.....33c

Boiler Plates.

("Gaylord"--Standard Quality.)
C. No. 1.....4 50
C. H. No. 1 Sheil.....4 75
C. H. No. 1, 50,000.....5 25
C. H. No. 1, 55,000.....5 75
C. H. No. 1 Flange.....6 50
Firebox
T. S., 60,000.....(as per)..6 50
T. S., 65,000.....(act of)..
Homo. Steel, 70,000 (of Cong).7 50
Heads, ½c ₰ lb. extra.
N.B.—Eastern brands of boiler plate at from 2-10 to 3-10c ₰ lb less than above prices.

Sheet and Tank Rivets. "Norway."

All sizes.....dis. 15

Boiler Rivets—"Albany."

½, ⅝, 11-16, and ¾ in. diam.5 50

Boiler Makers' Tools.

Doty's Power Shears...net list
" Hand Lever Shears.net list
" Power Punch.....net list
" Hand Punch.....net list
Steel Screw Punch.....net list
Iron Screw Punch.....net list
Boiler Plate Rolls.....net list
Buffalo Forges & Blowers dis 20
Watson's " " net list
Spring Tube Expander....dis 15
Roller Tube Expander..net list
National Tube Cleaner...dis 20
Wire Flue Brushes.....net list
Anvils—"Peter Wright" 12½ ₰ lb
Solid Box Vises.....net list

Nuts, Bolts, etc.

Square & Hex. Nuts....7 off list
Washers.....list
Machine Bolts.....dis 60
Bolt Ends.....dis 60
Boiler Patch Bolts.....net list

Boiler Tubes.

"National" Standard Gauge 1 inch to 10 inch.....dis 37½
"National" Standard Gauge 11 inch to 15 inch dis 25
"National" Special Locomotive Tubes.....net list

IRON AND STEEL.

Flat Bar.

1¼ to 4 by ¼ to 1 inch.....2 60
4¼ to 6 by ¼ to 1 inch.....2 70
1¾ to 6 by 1¼ to 1½ inch....3 00
1¼ & 1¾ by ¼ to ½.....2 70
1 & 1¼ by ¼ to ½.....2 80
⅝ & ¾ and ⅞ by ¼ to ½.....3 00

Round,

1 to 1¾ inch.....2 60
2 to 2⅝.....2 80
2¾ to 3¼.....3 10
3¾ to 4.....3 60
4¼ to 4½.....4 10
4¾ to 5.....4 30

Square.

1 to 1¾ inch.....2 60
2 to 2¾.....2 80
2¾ to 3¼.....3 10
3¾ to 4.....3 60
¼ to ⅞.....2 70

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch. 2 80
1 to 1¾ by ¼ and 5-16 do 2 90
¼ to ⅞ by ¼ and 5-16 do 3 10
⅝ to ¾ by ¼ and 5-16 do 3 60

Half Oval and Half Round.

Wagon box iron ¼ and ⅜..4 10
1-10c per lb extra will be charged for cutting to specified lengths

Light Band.

1¼ to 6 by ¼ to 3-16.....3 10

Hoops.

1¼ to 2, Nos 16 to 18.....3 50
1¼ to 4 do 13 to 15.....3 40
1-10 extra for each gauge lighter

Sheet Iron.

No 22 to 24.....4 50
No 25 to 26.....4 70
No 27.....4 90
No 28.....5 30

English Steel.

Best cast.....₰ lb 15½c
Extra cast.....16½c
Round machinery, cast.....14c
Swaged, cast.....18c
Best double shear.....15½c
Blister, 1st quality.....13c
Refined tool steel.....16½c
Spring calking.....7¼@7½c
German steel, best.....11c
2d quality.....10c
3d quality.....9c
Sheet cast steel, 1st quality.....15½c
2d quality.....14¼c
3d quality.....12½c

American Steel.

Best brands of refined cast steel, ⅜ to 2 inches....12c
Crucible cast.....7c
Open-hearth ditto.....4½c
Hammer cast steel.....9c
Spring cast steel.....7¾c
Bessemer and open-hearth spring.....5c
Ditto plow.....4½c
Steel boiler plate.....6½@7c
Bessemer machinery...5 @6c
Spring and calking.....7¼@7½c
Tire.....5
Sleigh shoe.....5

Bessemer Steel Tire.

¾ to 1 by 3-32.....4½ ₰ lb
¾ to 1 by ¼ to 5-32.....4½ ₰ lb
¾ to 1 by 3-16 to ¼.....4½ ₰ lb

Miscellaneous Cast Steel.

Auger and auger bit.....1
Axle steel for wagons.....7
Frog points and plates.....8
Frog size bars.....8½
Pick, hammered.....10
Mattock, beveled.....9
Table cutlery.....7¾
Trap spring steel.....10
Pike and cant hook.....9
Coal and granite.....8½

TINNER'S STOCK.

Tin.

Banca,.....per lb. 26c
Straits....." 26c
English....." 27c
Bar....." 27c

Tin Plate,

IC 12x12 charcoal.....$ 6 50
IC 14x20 do.....6 25@6 50
IX 14x20 do.....8 25
DC 12½x17 do.....6 00
DX 12½x17 do.....8 00
DXX, 12½x17 do.....10 00
DXXX, 12½x17 do.....12 00
IC, 20x28 do.....14 50
IX, 20x28 do.....15 50
IC, 14x20, Best Roof.....6 00
IX, 14x20, do.....8 00
IC, 20x28 do.....13 00
IX, 20x28 do.....14 50
IC, 10x14 Best Coke.....5 75

Solder.

Half and Half, in bars.....15¾
No. 1 do.....14½
Spelter Solder.....25

Pat Planished Sheet Iron

(A).....per lb 10½c
(B).....9¾c

Nos	10	15	21	25
	to 14	20	24 & 26	
Com	3-60	3-80	4-00	4-20
Char	5-60	5-60	6-00	6-20

Sheets over 28 in. wide ¼c extra

Zinc.

Sheet, cask.....8c
Sheet, open.....8@ 8½

inners' Tools & Machines

Machines (P. S. & W.) list add 20
Tools (P. S. & W.).....add 6

Plumbers', Steam and Gas Fitters' Supplies.

Wrought Iron Pipe.....dis 60.
Steam Brass Goods.....dis 45
Water " " .....dis 40
Enameled Pipe.....di 65
Artesian Well Casing....net list
Hydraulic Tubes.....net list
Malleable Iron Fittings..net list
Cast Iron Fittings.....dis. 45
Globe Valves.....dis. 35
Angle Valves.....dis. 35
Check Valves.....dis. 45
Safety Valves.....dis 35
Ludlow Gate Valves....dis. 20
Ball Gauge Cocks (net per dozen).....$15
Compression Gauge Cocks dis. 35
Montg'ry Gauge Cocks...dis 35
Register Gauge Cocks (net per piece).....$1 00
Cylinder Cocks.....dis. 30
Air Cocks (net per dozen)...$2 75
Oil Cups.....dis. 30
Steam Gauges.....dis. 40
Water Gauges.....dis. 40
Scotch Glass Tubes.....dis. 50
Steam Whistles.....dis. 45
Pipe Tools.....special
Globe, Angle and Check Valves (Star's regrinding).....dis. 25
Duplex Injectors.....net. 20
Soil Pipe & Fittings.....dis. 20
Sinks.....dis. 25
Bath tubs &c.....dis. 20

Babbitt Metal.

Babbit Metal, No. 4.....8c
Babbot Metal, A No. 1.....12c
Babbit Metal, J. B.....85c
Babbit Metal, genuine.....35c

LEAD.

American, ₰ lb.....5¼c
Bar, ₰ lb 6¼c dis 10 per ct
Pipe, ₰ lb 7¼c dis 10 per ct
Sheet, ₰ lb..8c dis 10 per ct
Tin-lined pipe ₰ lb 15c dis 10 pr ct
Shot Drop 7c; Buck....7c
Chilled Shot.....8c

COPPER.

Lake Ingot.....18@18¼c
Baltimore.....17¾@17¾c
Arizona.....17¾@17¾c
Sheathing Braziers Copper, Bolts, &c.
Brazier's Copper, ordinary sizes, 16 oz. per sq. foot, and over per lb.....30c
Brazier's Copper, ordinary sizes, under 16 oz. and over 12 oz. per sq. foot, per lb. 32c
Brazier's Copper, 10 oz and 12 oz per sq ft. per lb. 34c
Brazier's Copper lighter than 10 oz. per sq ft...per lb. 36c
Circles less than 84 inches in diameter.....per lb. 33c
Circles 84 inches in diameter and over.....per lb. 30c
Segment and Pattern sheets per lb. 33c
Locomotive Fire Box sheets per lb. 30c
Sheathing Copper, over 12 oz. per sq. ft.....per lb. 28c
Bolt Copper.....per lb. 30c
Copper Bottoms..per lb. 31@32c
No copper is Sheathing except 14x10 inches, and not to exceed 84 oz. to the sq. ft.

Tinning.

14x18.....per sheet 6c
All other size sheets, 2½c per square foot For tinning both sides, double the above amount.

SCRAP IRON AND OLD METAL

DEALER'S SELLING PRICES.

	Net Tons.
No. 1 wrought scrap	$24
Sheet and hoop "	10@11
Cast scrap, (No. 1 heavy)	19
Cast Scrap (Stove Plate)	12

OLD METALS.

Old copper per lb	15c
No. 1 H. Brass per ₰	14
Heavy yellow Brass do	12
Light Brass per ₰	12
Scrap Zinc per ₰	6½
Tea Lead per ₰	4
Heavy Lead per ₰	3

PIPE, WROUGHT.

Standard Wrought Iron Lap Welded Steam and Gas

Inside Diameter. Inches.	Plain, Price Per Foot.	Galvan. or Enameled Per Foot.	Outside Diameter Inches.	Weight Per Foot.
⅛	08		.40	.24
¼	08	$0 11	.54	.42
⅜	09	12	.67	.56
½	11	15	.84	.85
¾	13½	19	1.05	1.13
1	19	28	1.31	1.67
1¼	27	40	1.66	2.26
1½	33	47	1.90	2.69
2	46	64	2.37	3.66
2½	75	1 00	2.87	5.77
3	95	1 30	3.50	7.55
3½	1 25	1 70	4 00	9.05
4	1 50	2 05	4.50	10.73
4½	1 75	2 40	5.00	12.49
5	2 25	3 00	5.56	14.56
6	2 75	4 00	6.62	18.76
7	3 75	....	7.62	23.00
8	4 75	....	8.62	28.00
9	6 50	....	9.68	34.40
10	8 00	....	10 75	40.64
12	12 00	....		54.65

Discount, 62½ per cent; galvanized, 62½ per cent.

BRASS.

Cash prices for Roll and Sheet Brass. For less quantity than 100 lbs. add 3c per lb.

High Brass

All Nos. not thinner than No. 28, wider than 2 in. not wider than 14 inch.....30c
All Nos. to No. 28, inclusive, and widths over 14 to 20 in. inclusive.....35c
All Nos. to No. 28, inclusive, and widths over 20 to 30 in. inclusive.....38c
¼c per lb. advance on each No. above Nos. 28 to 38, inclusive.
All Brass thinner than No. 8 is Platers' Brass at.....53c
Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 inches, in width wider than 2 inches 37c

Low Brass.

4c per lb. more than High Brass.
Gilding metal 8c per lb. more than High Brass.

Platers' or Gold Metal

In Bars.....48c
Sawed.....51c
Planed or Polished...54c

For Slitting.

Metal in width in. to ⅛ in. to No. 28, inclusive, 1c per lb advance
Metal, in width 2 in. to 1 in., thinner than No. 28, 2c per lb. advance
Metal, in width ⅛ in. to ¼ in. thinner than No. 28, 5c per lb. advance.
Metal ¼ in. in width and less, 10c per lb. advance.
Any of the above widths cut to particular lengths, add 7c per pound.

COAL,

WHOLESALE.

Wholesale f.o.b vessel at Cleveland:

Carbon Hill and Monday Creek	$2 65
Massillon	2 75@ 2 85
Brier Hill	3 25@3 75
Pittsburgh	3 00
Salineville	2 25
Tuscarawas	2 25

RETAIL.—Delivered.

Massillon Lump	$4 00
" Nut	3 75
Carbon Hill and Monday Creek, lump	3 75
Carbon Hill and Monday Creek, nut	3 50

75c less on cars by car load.

Anthracite Stove and Chestnut	7 15
Egg and grate	6 00

GLASS.

(Per box of 50 feet)

SINGLE THICKNESS

6x8 to 10x15	
11x14 to 15x24	8 50
16x24 to 20x28	9 75
15x34 to 24x30	10 75
26x28 to 24x36	11 50
26x36 to 26x44	13
26x46 to 30x50	14 00

DOUBLE THICKNESS

6x8 to 10x15	11 7
11x14 to 15x24	13 25
16x24 to 20x28	15 75
15x34 to 24x30	17 25
26x28 to 24x36	18 50
26x36 to 26x44	21 25
30x50	22 50
30x52 to 30x54	23 25
30x56 to 34x56	25 00
34x58 to 34x60	27 75
26x60 to 40x60	30 00

Dis 60 & 15 single, 60 & 20 double

OILS.

Pure Oils. packages included	
Sperm, winter bleached per gal	1 25
Whale, winter bleached per gal	63
Straits	50@53
"A" oil for tanner's use	35 @40
Lard oil extra W S	1 03@1 10
do No 1 do	82@87
do No 2 do	72@77
Tallow oil	75
Neatsfoot oil pure	90@95
do No 1	80@85
Linseed oil, raw	54
do do boiled	57
Cotton seed oil white	64 @ 66
do do yellow	60 @ 63
West Virginia lubricating 28 deg	20c@30c
Pure Mecca	55@ 60
Paraffine oil winter pressed	25@ 30
Machinery	40
Engine	50
Miners' oil	40@45
Drilling oil	40

Hides and Leather.

Prime cured hides,	8¾@9
Green hides	5@6
Bull, scrubby, badly scored or damaged, cured, two-thirds price.	
Prime dry hides	13@14
Horse hides, green	No. 1, $2 00
Prime cured veal calf,	12@12½
Ohio Deacon S, salted	60
Pelts, wool on	25@30
Fresh slaughter sheep	30@$1 50
Fresh slaughter lambs	50@60
Green calf skins	13
Hemlock rough	23@24
Oak harness	34@38
Oak sold	37@40
Union harness	31@34

Cleveland Business Directory.

Assayers and Analytical Chemists.

JUDSON, W, E, Ana ytical Chemist, 8 Cushing Block.

Bolt and Nut Works.

HOTCHKISS & GAYLORD, manuf'rs. Machine, Plow & Elevator Bolts, Coach Screws.

Boiler Makers.

SMITH & TEACHOUT — (Established 1857.) Boiler, Tanks, Stills etc. 489 Broadway.

Bridge Builders.

BUCKEYE BRIDGE AND BOILER WORKS mfrs of Arch & Truss Bridges, Boiler Tanks and Oil Stills. Bet. Wasson St. and Case Ave.

Coal and Iron Exchange.

JACKSON IRON CO. Iron Ore and Pig Iron. Rooms 8 and 9. Fayette Brown, Gen. Agent.

RHODES & CO. Coal, Iron Ore an Pig Iron. Rooms 1 and 2.

Carriage Blacksmith.

STRIEBEL, CHAS. manfac'r. of Carriages and Wagons and platform trucks. Horse shoeing and general blacksmithing .93 Woodland ave.

Carriage Bolts.

THE COLWELL & COLLINS NORWAY BOLT CO., manufacturers of Philadelphia Carriage and Tire Bolts.

Church and School Furniture.

FAULHABER, GEO. manufacturer of School and Church Furniture. Fine Hard Wood work a specialty. 203 Ontario Street.

Custom Boots and Shoes.

ROONEY, JOHN manufacturer of hand-made Boots & Shoes, custom made and warranted 177 Ontario Street.

Carriage Repository.

GREENE'S, J. O., Carriage Repository, 408 Superior street and 52, 54 & 56 Rockwell street, dealer in Fine Carriages. Repair shop in connection.

SLATER, G. A., Carriage dealer, sells the best work for the lowest price. A fine assortment always on hand. Repository 365 Euclid Avenue.

Coal and Pig Iron.

ANDREWS, HITCHCOCK & CO., Briar Hill Coal and Pig Iron. 122 Water Street.

Electrical,

ELECTRIC SUPPLY CO. manfrs and dealers in Electric Burglar Alarms, Anunciators, Cell Bells and Batteries. Telephone lines built and repaired. 145 Seneca Street.

Fresco Artists.

KEMMER & KUSHMAN DECORATIVE CO., Fresco Artists, Fine Modern Wall Papers. 338 Euclid ave.

Foundries.

BOWLER & CO., Car Wheels, Patent Chilled Frogs, and all kinds of castings. 9 Winter.

CLEVELAND MALLEABLE IRON CO., manufacturers Malleable Iron Castins.

LAKE SHORE FOUNDRY, Water and Gas Pipe, Light and Heavy Castings. Alabama st.

TAYLOR & BOGGIS, successors to H. & H. F. Taylor, Iron Founders, 65 to 73 Central Way.

FITZSIMONS WM. & SON, Rolling Mill and Machinery castings. Rolls a Specialty. No. 435 Broadway.

File and Saw Works.

PARKIN, W. H. & CO., Hand-cut Files and Rasps, dealers in Disston's saws, 11 So. Water

Flue Cleaner.

CLEVELAND FLUE CLEANER M'F'G. CO. manufacturer of Aitchison & Doolittle's Patent Steam Flue Cleaner, 22 & 24 Power Block.

Hotels.

FOREST CITY HOUSE, cor. Public Square and Superior st., Terrill & Ingersoll, Props.

KENNARD HOUSE, D. McClasky, Prop.

NEW ENGLAND HOTEL, Water st., W. W. Wolcott, Prop. Refitted and refurnished.

STRIEBINGER HOUSE, between Ontario and Seneca sts. $2.00 per day. Hawley & Langton

CITY HOTEL, Seneca street. H. B. West, proprietor. $1.50 per day.

Hides, Pelts and Leather.

DENNISON BROS., dealers in Hides, Pelts, Furs and Tallow, 48 and 50 River street.

Hardwood Lumber.

MARTIN, J. T. dealer in Hardwood Lumber, Stone's Levee, near Central Way.

Lumber.

WOODS, PERRY & CO., manufacturers and dealers in Lumber, Lath, etc., 5 Carter st.

FISHER, WILSON & CO., wholesale lumber dealers (pine & hard wood), rough and dressed umber, timber, lath, shingles, etc. 47 Central Way

KRAUSE, C. A., & SON, wholesale and retail dealers in lumber. Yards cor. Superior and Wason and 281 Merwin streets.

Cleveland Business Directory.

Hardware and Iron.

BINGHAM, WM. & CO., Hardware, Iron, Nails and Metals, 148 and 150 Water street.

CLEVELAND ROLLING MILL CO., manuf'rs. of Steel and Iron Wire and Steel Tire.

WORTHINGTON, GEO. & CO., Hardware and Dealers in Metals. Water street.

Lime Manufacturers.

RUSSELL LIME CO., manufacturers of White Lime; also dealers in Plaster, Cement, etc. 85 Elm street.

Machinery and Boilers.

CLEVELAND STEAM FURNACE CO., Engines and Boilers, cor. Detroit and Center sts.

KRITCH, K. E. Metal Pattern Maker. Small machinery repaired. Lawn Mower sharpening a specialty. 42 South Water Street.

Machinery Depot.

CLEVELAND MACHINERY DEPOT, (now National Machinery Depot.) The largest stock of New and Second-hand Engines, Boilers and Machinists' Tools. Shop and Warehouse corner Bond and Superior streets.

Mercantile Agency.

THE MERCANTILE AGENCY. R. G. Dun & Co. proprietors. 121 Superior street.

Oil Manufacturers.

AMERICAN LUBRICATING OIL CO., manufacturers of lubricating oils, 23 Euclid ave.

Pattern and Model Makers.

WHITTINGHAM, J. & C., Metal Pattern and Model makers 52 Canal Street.

REID, J. C., Pattern and Model Maker. 52 Canal Street., (Up Stairs.)

COTTRELL & CO., W. L., Pattern Makers, 53 Center street.

STAIR BUILDER.

PFEIL, CHAS, Stair Builder; Hard Wood Mantles and Office Railing. Works, 49 & 51 Canal street, Cleveland, Ohio

JOHNSON & PURSER, Stair Builders, and manuf'rs of Mantels, Odd Pieces of Furniture, &c. 30 West street, up stairs.

Steel Stamps and Stencils.

FLEHARTY, J. H. & CO., Rubber Stamps, Seals, Stencils. 197 Superior street.

Steam Furnaces.

CUYAHOGA STEAM FURNACE CO., Manfrs of Land and Marine Engines. Machinery for Blast Furnaces, Rolling Mills, Bessemer Steel Works, &c. Mill-Gearing and all kinds of Castings, Foundry, Machine and Boiler Shops.

Trunks and Valices.

FABER, J. manuf. Trunk, Traveling Bags and Ladies' Fine Satchels. Sample Trunks and Cases a Specialty. 58 Public Square.

Vessel Agents.

WEBB, H. J. & CO., Ship Brokers and Vessel agents. 17 & 18 Board of Trade Building. 122 Water Street.

Wood Carving.

HERKOMMER, J., Carver and Ornamenter in Composition. 225 Erie street.

Business Directory.

Akron, O.

AKRON IRON CO., manufacture best Common, Refined and Charcoal Iron.

CASCADE HOUSE, cor. Mill and Summit sts., near Depot. J. Downie, Prop.

MCNEIL, J. C., Steam Boilers, Heavy Sheet Iron Work. Repairing promptly executed.

PERKINS, C. E., dealer in Agricultural Implements, machinery, and Manufacturers' Ag'nt

TAPLIN, RICE & CO., manuf'rs. of Stoves and Hollow Ware, dealers in Tinners' Stock, etc.

WEBSTER, CAMP & LANE MACHINE CO., Founders and Machinists, 12 Main street.

AKRON POLISHING & PLATING WORKS. Man'f'rs of solid leather wheels for polishers.

Alliance, O.

MCFARLAND, J. W. Engine and Machine Builder, and General Machine Jobbing.

Buffalo, N. Y.

SANDS, PAUL, Marine and Stationary Steam Engine Works mfr. of drilling machines, foot and power lathes. 70 Columbia street.

EMPIRE STATE MF'G CO., O. F. Swift, prop'r. manfr of Fluters, Sad Irons, Spun Copper & Half Copper Tea Kettles. Washington, cor. Ohio

WHITE, L. & I, J. manf'r's of Coopers' Tools, Carpenters' Tools, and Ship Tools. Also manf'r's of Planer Knives and Machine Cutters to order 310, 312, 314 Exchange street.

THE BUFFALO NUT AND BOLT CO [Limited.] Manufrs. of Hot Pressed Nuts, Bolts, Washers, Rivets, &c. No. 226 Ohio Street.

Cuyahoga Falls, O.

THOMAS BROTHERS, manfrs of Ohio Stone Ware. Cuyahoga Falls Stone Ware Factory, cor. Main and Broad streets,

TURNER, VAUGHN & TAYLOR, manufacture engines, presses and grinding machinery for clay; also paper, chain, wire and flour mill machinery. Send for Circulars and price list.

SNYDER, H. wholesale manu acturer of Sash, Doors, Blinds, &c. Send for Price Lists.

THE CUYAHOGA FORGE AND IRON CO., manfrs. of every description Car, Truck and Driving Axles, Forging, Shafting, &c.

Business Directory.

Canal Dover, O.

HECKMAN, E., manufr. and dealer in harness leather, upper, kipp and calf. Also, manufacturer & dealer in prime English Dairy cheese. Highest market cash price paid for hides.

Columbus, O.

PAT. ADJUSTABLE WINDOW CURTAIN Cornice, manufactured by Strader's Curtain Cornice Works.

ROYCE & PULLING manufrs of Patent Steam Pumps for all purposes. Store room 30 High street. Works Nos. 5 and 7 Scioto street.

U. S. CARRIAGE CO. builders of fine Carriages, Buggies and Phætons. Salesrooms and Office 257, 259 and 261 Fourth street.

REYNOLDS BROS., manufacturers of hand-cut Files and Rasps. Old files re-cut. Send for Price List.

CITY BOILER WORKS, manfrs of Stationary, Portable and Locomotive Steam Boilers. All work warranted. Borger Bros. & Co.

MURRAY, HAYDEN & CO., manfrs of Malleable Iron. Cor. Randolph & West streets.

Canton, O.

DIEBOLD SAFE & LOCK CO., manuf'rs. Safes, Locks, Bank and Safe Deposit Works.

NOVELTY IRON WORKS, Mill work, Shafting, engines, Imperial job printing press, etc

NEW AMERICAN HOUSE, Canton. Fred. Hipp, Prop.

Erie, Pa.

GUNNISON, A. B., wholesale manufacturer of Wood Pumps. 233 East Twenty-Second St.

BALL ENGINE CO., limited, manufacturers of Automatic Engines of 15 to 30 horse power

NOBLE SEWING MACHINE CO. manfrs of the New Noble Sewing Machine. Send for circulars and prices.

A. B. FELGEMAKER & CO. Church Organ builders. Descriptive catalogue furnished on application.

Geneva, O.

THE ENTERPRISE MACHINE CO., L. L. Crane, Pres't, manfrs of Machinists' Tools and Machinery. Gear Cutting a specialty.

Lima, O.

LIMA HOUSE, centrally located; telegraph office in the house. J. Goldsmith, Prop.

Meadville, Pa.

CURRY & CO. general jobbers in Castings of all kinds.

Olean, N. Y.

MYRICK BROS. & CO., manufact'rs Engines and Boilers, oil drilling tools, rig irons, etc.

Oil City, Pa.

REID, JOS. Machinist, steam engine and pump repairing. Brass and iron castings, light and heavy, made on short notice.

Pittsburgh, Pa.

PRINTING PRESSES. W. A. Bunting, manufacturers' agent. Printers supplies, type, cards. 42½ Sixth Street. [Up stairs.]

BAIR & GAZZAM, practical machinists; gear cutting a specialty. Rice's Feed Water and Heater. 17 Wood street, corner First Avenue.

Painesville, O.

NORTH AMERICAN CUTLERY CO., m'fr's of Steel Shears and Scissors—best quality.

Ravenna, O.

THOMPSON, T. F., dealer in Agricultural Implements, farm machinery, hardware, seeds, fertilizers, &c. Cor. Main and Prospect sts.

BALDWIN, D. L. & SON, Contractors & Builders and manfrs of all kinds of Moulding, flooring, siding, &c. Rip, Band and Scroll Sawing.

Rheims, N. Y.

GREAT WESTERN CHAMPAGNE. Finest made in America. Equal to best imported. Has taken highest awards everywhere, and is used all over the Continent. Try a case, and you will have no other. Pleasant Valley Wine Co., Rheims, N. Y.

Rochester, N. Y.

GOWE, JNO. N., mfrs. of Specialties, such as Machine forging, bridge bolts and trusses, railroad switches, spike, mall, chisels, &c.

ELEVATORS for Hotels, Factories and Private Houses. J. S. GRAHAM & CO.

WOOD-WORKING MACHINERY. Send for Catalogue. J. S. GRAHAM & CO.

RAZOR STROPS. Sole mfrs. of all kinds of Razor Strops. Uischt, Linn & Co. 131 N. Water

Rochester, Pa.

OLIVE STOVE WORKS, (limited) manufacturers of Stoves and Hollow Ware.

Steubenville, O.

DORRANCE, D. W., Tool Works, manufacturer of hand-made miners' and stone-cutters' Tools Promp attention given to mail orders.

Sandusky, O.

SANDUSKY WHEEL CO. manfrs. of Sarven Patent Wheels, Carriage Bodies and Seats, Plain Wood Hub Wheels, Banded Hub Wheels, Jacobs' Patent Neck Yokes.

Business Directory.

Sandy Lake, Pa.

EBERMANN, W. S. & SONS, manfrs. of the celebrated Ebermann Boiler Feeder. Send for Circulars and Price List.

Titusville, Pa.

FOSTER & McKAY, dealers in boilers and engines, tubing, casing, old iron, rope, and all kinds of metals. Washington street, nr. Railroad.

Toledo, O.

BAKER, HERBERT, Machine Shop and Iron Foundry. 98 and 100 Erie street.

TOLEDO FOUNDRY AND MACHINE CO. builders of Steam Engines, Circular Saw Mills and all kinds machinery. Water St., cor. Cherry

RUSSELL IRON WORKS, mnfrs. of Architectural Iron Work, castings, pulleys, shafting and steam bending machinery. Cor. Water and Lagrange streets.

STANDARD SAW WORKS, H. Bartley, manufacturer and dealer in Saws of every description. All kinds of Springs made from Sheet Steel, Reaper, Hay Knives Truss Springs, &c. made to order. 92 St. Clair Street.

UNION Wooden Ware Manufacturing Co. manufacture Sewing machines, washboards, children's wagons, carts, wheelbarrows, sleds, kitchen wooden ware, &c.

HEPBURN BROTHERS, proprie. Union Boat Works. Boats of all kinds made to order. For sale or rent. Water Street foot of Cherry.

Union City, Ind.

LAMBERT, J. W. & CO., mfrs of fork, rake, hoe and broom handles; spokes, hubs, whiffletrees, yokes, plow-rounds, &c. Correspondence solicited.

Wheeling, W. Va.

EXCELSIOR MACHINE WORKS, Redman & Co., general machinists and manufacturers of Marine and Stationary Engines, Hangers, Pullies, Shafting, &c. Cor. 18th & Chapline streets.

Youngstown, O.

BELL, EDWIN & SON, manuf. of Nail Kegs, Pat. coiled hoops, slack barrel and keg heading and oil barrel stock.

DINGLEDY, G. H. dealer in rough and dressed Lumber, Shingles and Lath.

MORTON HOUSE, formerly Maitland House, James Morton, Prop.

TOD HOUSE, cor. Diamond and Market streets. Henkel & Bowman, Props.

Zanesville, O.

KIRK HOUSE, William Kirk, proprietor. $1.50 per day.

Brattleboro', Vt,

A JOY FOREVER!

ESTEY ORGANS

Manufactured by

J. ESTEY & CO.,

Brattleboro', Vt.

(Catalogue free on application.)

CLEVELAND NON-CONDUCTING CO.

MANUFACTURERS & DEALERS IN

ASBESTOS, HAIR FELT, CEMENT, & OTHER

Pipe Coverings,

19 SOUTH WATER STREET,

CLEVELAND, OHIO.

T. NEW'S PREPARED ROOFING

For steep or flat roofs. Applied by ordinary workmen at one-third the cost of tin. Circulars and samples free.

T. NEW, 32 John St., New York.

Barrett, Arnold & Kimball,

Western Agents, Chicago, Ill.

E. F. ENSIGN,

JOBBER OF

Agricultural Implements,

WAGONS, FERTILIZERS, SEEDS, &C.

The Empire Grain and Fertilizer Drill and Twine Binding Harvesters Specialties.

134 ST CLAIR STREET, CLEVELAND, O

TRAVELERS' REGISTER.

Lake Shore & Michigan Southern.

TRAINS GOING EAST.	Arrive. From West.	Depart. From East.
Fast N. Y. Express	*1 35 a m	*1 50 a m
N.Y.,Boston & AtlanticEx.	*7 05 a m	*7 30 a m
Elyria Accommodation	‡8 35 a m	.....
Pt.Clinton Accommodation	‡11 00 a m	.....
Buffalo Accommodation	‡11 00 a m	‡11 15 a m
N. Y. and Boston Fast Ex.	*2 25 p m	*2 55 p m
Conneaut Accommodation	.....	‡4 50 p m
Night Express	‡10 10 p m	‡10 35 p m
TRAINS GOING WEST.	**Arrive. From East**	**Depart. From west.**
Fast Limited Express	*12 21 a m	*12 33 a m
Mich. Ex. via Sandusky	*2 50 a m	*3 05 a m
Chicago Ex. via Sandusky	‡6 35 a m	7 00 a m
Mich. Accom. via Norwalk	.....	‡6 40 a m
Conneaut Accommodation	‡8 40 a m	.....
Toledo Ex. via Norwalk	‡1 25 p m	‡3 30 p m
St. Louis Ex.via Sandusky	*1 40 p m	*2 05 p m
Chi. Pac. Ex. via Norwalk.	*7 05 p m	*7 35 p m
Pt.Clinton Accommodation	.....	‡5 00 p m

Sunday trains for Nottingham—Depart 0:00 a m m. and 2:15 p. m., return at 10:05 a. m. and 4:45 p. m.

Reference marks—*Daily. †Daily except Sunday. ‡Daily except Monday.

Cleveland, Columbus, Cincinnati & Indianapolis.

ARRIVALS.

No. 2 Col. & Cin. & Ind'polis Ex.	*7 10 A.M
No. 8 C. T.V. & W. & Clev Accom	10 30
No. 12 St. Louis & New York Exp.	*3 00 P.M
No 6 Indianapolis & Columbus Exp	10 20
No 4 Columbus & Cincinnati Exp.	*3 40
No. 10 Wheeling Express	7 15

DEPARTURES.

No. 1 Cincinnati & Columbus Exp.	*8 00 A.M
No. 11 Cleve, Indianap. & Wheel'g Ex.	7 10
No. 3 Special St. Louis & Cincinnati Ex**	1 55 P.M
No. 5 Night Express	*7 25
No. 7 C.T.V. & W. & Col.Accom	4 00

**This train runs daily to Indianapolis and St. Louis, and daily, except Sunday, to Cincinnati.

Cleveland, Tuscarawas Valley & Wheeling.

ARRIVALS.

Wheeling & Cleveland Express	8 25 P.M
Uhrichsville Express	10 30 A.M

DEPARTURES.

Wheeling & Cleveland Express	7 15 A.M
Uhrichsville Express	4 00 P.M

New York, Pennsylvania & Ohio.

ARRIVALS	a.m.	a.m.	p.m.	p.m.
Through from East	6 50	.....	.....	*7 00
N.Y. P. & O. (Mahoning)	10 55	.....	2 00	*7 00
Pittsburgh Express	.....	.....	2 00	*7 00
Pittsb'g& Youngs'tn Ac	10 55	.....	.....	10 15
DEPARTURES.	**a.m.**	**a.m.**	**p.m.**	**p.m.**
Through Eastern Train	*7 10	.....	.....	10 45
N. Y. P. & O.(Mahoning)	.....	.....	.....	4 25
Youngs'tn & Pitts'bg Ac	.....	11 00	.....	.....
Pittsburgh Express	.....	*7 10	*2 30	.....

Cleveland & Pittsburgh.

	ARRIVE.	DEPART
Pittsburg & Wheeling	1 45 P.M	8 50 A.M
Express	6 55	2 30 P.M
Alliance Accommodation	10 15 A.M	3 45
Ravenna Accommodation	8 35	5 35
Night Express	6 30 A.M	‡11 40 P.M

‡ Night Express runs daily, except Saturday, by way of Wellsville, and on Saturday by way of Alliance.

Valley Railway.

ARRIVE.		DEPARTURES.	
No. 2 Accom.	10 15 A.M	No. 1 Mail	8 15 A.M
No. 6 Express	1 35 P.M	No. 3 Accom.	2 30 P.M
No. 4 Mail	6 30 P.M	No. 5 Exp.	6 05

Special trains leave on Sunday at 8.25 A. M. and 4.20 P. M., arriving at Cleveland at 10 A. M. and 6.25 P. M.

Trains leave from Depot foot of South Water Street.

Connotton Valley Railway.

Arrive.		Depart.	
No. 1	10 05 A.M	No. 4	9 15 A.M
No. 3	6 40 P.M	No. 2	4 05 P.M

All trains arrive and leave depot corner Commercial and Fifth Streets

Cleveland, Akron & Columbus Railroad.

Cleveland, Akron & Columbus Railroad, running over Cleveland & Pittsburgh Railroad to Hudson, for Akron, Columbus, etc.

	ARRIVE.	DEPART.
Mail	1 15 P.M	8 00 A.M
Express	7 25	1 50 P.M
Accommodation	10 10 A.M	3 45 P.M

CLEVELAND & PITTSBURGH

RAILROAD.

Trains leave Cleveland and arrive at the points named below as follows: Night Express runs daily, all other trains daily except Sundays.

	Mail.	Fast Line.	Accom.	Night Expr'ss.
Leave Cleveland	8 50 am	2 40 pm	3 45 pm	11 40 pm
Arrive Hudson	10 00	3 28	4 50	12 50 am
Ravenna	10 40	3 58	5 50	1 18
Alliance	11 25	4 25	6 05 pm	2 05
N. Philadel	11 35 pm	7 5	.....	10 55
Salem	12 25	.....	.....	3 02
Canton	12 28	5 47	.....	3 20
Massillon via Alliance	12 50	6 06	.....	3 38
Akron	10 42 am	4 10	5 40 pm	.....
Pittsburgh	3 30 pm	7 45	.....	6 55
Wheeling	5 10	8 10	.....	8 55
Marietta	8 45	.....	.....	.....
Harrisburg	.....	4 15 am	.....	4 10 pm
Philadelphia	.....	7 50	.....	7 35
New York	.....	11 15	.....	10 35
Baltimore	.....	7 55	.....	7 20
Washington	.....	9 17	.....	8 47
Boston	.....	8 00 pm	.....	.....

Ravenna Accommodation leaves Cleveland at 5:30 p m, reaching Ravenna at 7:15 p m; Akron 7:23 p m.

Newburgh Accommodations leave Cleveland at 11:00 a m and 12:30 pm. Returning, leave Newburgh at 11:10 am and 1:30 pm.

Passengers for New York, Philadelphia, Baltimore, Washington, and all points east of Pittsburgh make but one change of cars, viz. at Union Depot, Pittsburgh, excepting those leaving on the Fast Line which has Pullman Sleepers from Cleveland to Philadelphia and New York.

The Fast Line leaving at 2:30 P M. has elegant Pullman Palace Sleeping Cars through from Cleveland to New York without change. Pittsburgh Passengers who desire Parlor Car accommodations can secure seats in this car.

The Night Express has Pullman Sleeping Cars from Cleveland to Pittsburgh which can be occupied by passengers at Union Depot, Cleveland, any time after 9:00 P M. At Pittsburgh passengers can take elegant through Parlor or Sleeping Cars for the East.

Sleeping and Parlor Car accommodations from Cleveland and Pittsburgh eastward can be secured at the Union Sleeping and Parlor Car Office Union Passenger Depot; of H. C. Marshall, Union Ticket Office, Weddell House; or of the Ticket Agent at the Euclid Avenue Station.

Through tickets can also be secured at the same points. Baggage checked through from the Union Depot or from Euclid Avenue Station.

By the 8:50 A. M, train a through car leaves daily for Akron, Gambier, Mt. Vernon, Columbus and immediate points, without change.

The 2:30 P. M. train has through car for Akron, Orrville, Columbus and immediate points, arriving in Columbus at 9:25 P. M.

By the 3:45 P. M. Accommodation train cars run through without change from Cleveland to Cuyahoga Falls, Akron and Millersburgh.

Night Express leaving Cleveland at 11:40 P. M., runs daily, and makes connection at Wellsville for Steubenville, Bridgeport, Wheeling, Bellaire and intermediate points. Every night in the week except Saturday the night express runs via Wellsville. On Saturday nights it runs via Alliance. All other trains run daily except Sunday.

Trains arrive at Cleveland.—Night Express at 6:30 P. M., having Pullman Sleeper from Pittsburgh; Ravenna Accommodation, 8:35 A. M., Alliance Accommodation, 10:15 A. M.; New York Wheeling & Washington Mail, with Pullman Sleeping Car from New York and Philadelphia, 1:45 P. M.; New York, Philadelphia & Wheeling Express, 6:55 P. M.

WM. A. BALDWIN, General Manager. **E. A. FORD,** Gen'l Pass. & Tkt. Agt. Pittsburgh, Pa.

C. L. KIMBALL, District Passenger Agent, corner Bank and St. Clair streets, Cleveland.

Cleveland to New York,

VIA THE

NEW YORK, PENNSYLVANIA AND OHIO RAILROAD.

Formerly Atlantic & Great Western Railroad.]

For New York, Boston and the East. The shortest and quickest route to Pittsburgh, Washington, Baltimore and the Southeast

Until further notice trains will leave the new Central Depot, South Water Street and Viaduct, as follows:

7:10A.M. LIGHTNING EXPRESS, (daily,) sleeping and hotel coaches from Leavittsburg. 8:55 a.m. To New York, Albany and Boston without change. Parlor car, Cleveland to Salamanca. Arrives at Meadville 11:20 a.m., (dinner); Franklin, 12:33 p.m.; Oil City, 1:00 p.m.; Corry, 1:00 p.m.; Jamestown, (Lake Chatauqua) 1:57 p.m.; Buffalo, 6:15 p.m.; Rochester, 8:30 p.m.; Hornellsville, 6:40 p.m., (supper); Corning, 8:25 p.m.; Elmira, 8:57 p.m.; Binghampton, 10:58 p.m.; Albany, 6:00 a.m.; Boston, 2:45 p.m.; arriving at New York, 6:50 a.m.

10:45 P.M. NIGHT EXPRESS, (daily except Sunday), Sleeping Coach from Leavittsburg to New York without change. Arrives at Youngstown 1:45 a.m; Meadville, 3:50 a.m.; Corry, 5:20 a.m.; Jamestown, 6:22 a.m.; Buffalo, 9:45 a.m.; Rochester, 1:10 p.m.; Hornellsville, 11:20 a.m.; Corning, 12:53 p.m.; Elmira, 1:21 p.m.; Binghampton, 2:50 p.m.; New York, 9:25 p.m.

2:30 P.M. PITTSBURGH EXPRESS,—daily, through without change. Parlor Car, Cleveland to Pittsburgh, arrives at Youngstown, 5:00 p.m.; Pittsburgh, 7:48 p.m; Washington, 7:30 a.m.; Baltimore, 8:19 a.m; via Sharon and Meadville, 7:00 p. m.

4:25 P.M. MAHONING ACCOMMODATION, stopping at all way stations. Arrives at Youngstown, 7:25 p.m; Sharon, 8:30 p.m; Sharpsville 8:40 p.m; connects at Leavittsburg with train No. 20 for Meadville and intermediate points, arrives at Meadville, 11:05 p.m. Pittsburgh, 10:48 p. m.

7:10 A.M. PITTSBURGH EXPRESS,—(daily) through without change. Arrives at Youngstown, 9:50 a.m.; Sharon, 10:55 a.m.; Sharpsville, 11:05 a m; Pittsburgh, 12:45 p.m. Returning, leave Pittsburgh, 4:48 a.m., 8:33 a.m., and 1:13 p.m. and 4:20 p.m.

11:00 A.M. YOUNGSTOWN & PITTSBURGH Accommodation, stopping at all Way Stations, arriving at Youngstown 1:50 p m; Pittsburgh, 6:10 p.m. Trains arrive at Cleveland, 6:50 a.m., 7:00 p.m., 10:55 a. m. 2:00 p.m., and 10:15 p.m.

This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City, and intermediate points WITHOUT CHANGE. No change to Boston and New England cities.

Baggage Checked Through to All Points East

Through Tickets and information regarding the route can be obtained at the Union Ticket Office, corner Bank and Superior streets; at office 131 Bank street, and at new Depot of New York, Pennsylvania and Ohio Railway, South Water street and Viaduct, Cleveland.

A. E. CLARK, Gen. Pass'r. Agt., Cleveland, Ohio.
M. L. FOUTS, Pass. Agt., 131 Bank st., Cleveland.
J. M. FERRIS, Gen. Man'gr. Cleveland

NOTICE.—Hereafter all Passes must be returned to the General Passenger Agent within FIVE DAYS after date of expiration; otherwise they will be discontinued.

Blue Grass Route of Ohio

TIME TABLE.

The Cleveland, Mt. Vernon and Delaware RAILROAD.

GEO. D. WALKER, RECEIVER.

SOUTH-BOUND TRAINS

STATIONS.	Accom	Accom	Expr	Mail	Sundays only
Leave.	P M.	P. M.	P. M.	A.M.	P.M.
Cleveland	5 30	3.45	2.30	8.50	.....
Hudson	6 53	5.02	3 35	10.10	4 20
Cuyahoga Falls	7 11	5.30	3.53	10.29	4 40
Akron	7 23	5.46	4.10	10.42	5 00
*North Portage	P M.	6.00	4 24	10.54*	6 14
Clinton	.....	6 19	4.44	11.09	5 31
Warwick	.....	6 29	4.49	11.14	5 37
*Marshallville	.....	6 43	5.02	11.27*	5 50
Orrville	.....	6 58	5.14	11.42	6 02
*Apple Creek	.....	7.17	5 32	11.58*	6 22
Fredricksburg	.....	7.32	5.45	12.11	6 37
*Holmesville	.....	7.43	5 55	12.21*	6 48
Millersburg	Accom	7 55	6.08	12.34	7 00
	A. M.	P.M.			A.M.
Millersburg	5.50	.....	6.08	12.34	7 00
*Killbuck	6.02	.....	6.20	12.47*	7 12
*Black Creek	6.13	.....	6.31	12.59*	7 25
Gann	6.33 b 6.53 b	.....	6.51 7.11 s	1.19	7 47
Danville	7 04	.....	7.20	1.29	7 59
Howard	7.13	.....	7.29	1.38	8 10
Gambier	7.22	.....	7.38	1.47	8 20
Mt. Vernon	7.35	.....	7.51	2.00	8 33
*Bangs	7.45	.....	8.01	2.1*	8 45
*Mt. Liberty	7.53	.....	8.09	2.20*	8 54
Centerburg	8.05	.....	8.18	2.30	9 05
*Condit	8.19	.....	8.32	2.44*	9 19
*Sunbury	8.27	.....	8.40	2.58*	9 28
*Galena	8.32	.....	8.45	2.58*	9 34
Westerville	8.48	.....	9.00	3 15	9 50
Arrive at Columbus	9.15	.....	9.25	3.40	10 20
	A.M.		P M.	P.M.	A.M

NORTH-BOUND TRAINS.

STATIONS.	Expr	Mail	Accom	Accom	Sundays only
Arrive at	P M	P. M.	A. M.	A. M.	A.M.
Cleveland	1 45	6 55	10.15	8.20	.....
Hudson	12.35	5.48	8.53	7.15	10.30
Cuyahoga Falls	12.16	5 30	8.33	6.58	10.11
Akron	12.03	5.17	8.20	6.45	9.50
*North Portage	11.46	5.00*	8.03	A. M.	9.34
Clinton	11.30	4.44	7.46	.....	9.18
Warwick	11.25	4 37	7.37	.....	9.12
*Marshallville	11.10	4.27*	7.23	.....	9.00
Orrville	10.57	4.14	7.10 b 6.40 b	.....	8.47
*Apple Creek	10.40	3.56*	6.22	.....	8.27
Fredricksburg	10.26	3.43	6.08	.....	8 13
*Holmesville	10 16	3.33*	5.58	Accom	8.02
Millersburg	10 05	3.22	5.45		7.50
			A. M.	P. M.	P.M.
Millersburg	10 05	3.22	.....	8 35	7.25
*Killbuck	9 51	3.08*	.....	8.23	7.13
*Black Creek	9 39	2.57*	.....	8.11	7.00
Gann	9.17	2.36	.....	7.49	6 38
Danville	9.07	2.27	.....	7.39	6.25
Howard	8.58	2 18	.....	7 29	6.14
Gambier	8.49	2 09	.....	7.14	6 03
Mt. Vernon	8.37	1 57	.....	7 02	5.51
*Bangs	8.22	1.40*	.....	6.46*	5.37
*Mt. Liberty	8.14	1.31*	.....	6.37	5.28
Centerburg	8.05	1 22	.....	6.28	5.17
*Condit	7.51	1.09*	.....	6.14	5.03
*Sunbury	7.42	1.01*	.....	6.06	4.53
*Galena	7.37	12 56*	.....	6.00	4 47
Westerville	7.20	12 40	.....	5.43	4 30
Leave Columbus	6.55	12.15	.....	5.15	4.00
	A M	P M		P. M.	P.M.

* Stop on signal. B Breakfast. S Supper.

Special Round trip rates will be made for Sunday trains.

The Blue Grass Route of Ohio (Mt. Vernon line) will abandon their regular Sunday trains after September 10th, 1882.

N. MONSARRAT, Gen'l Supt. Akron, O
E. T. AFFLECK, General Passenger Ag't, Columbus, O.

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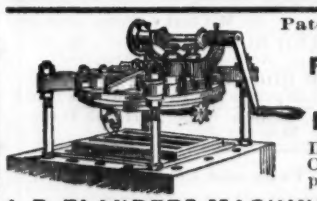

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Descriptive Circular on application.

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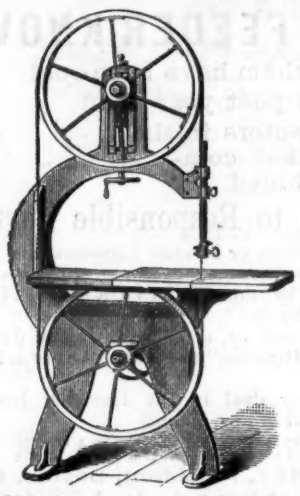

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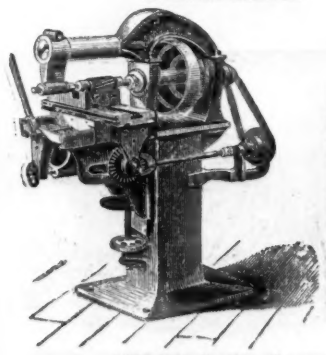

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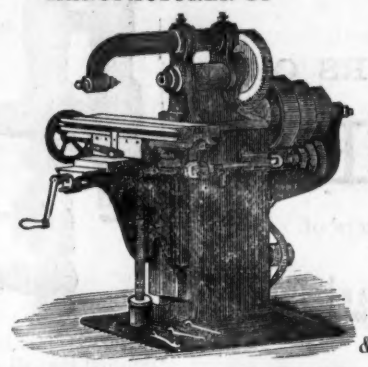

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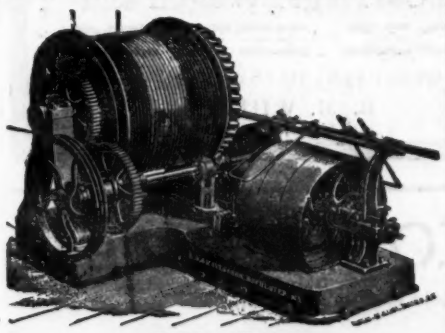

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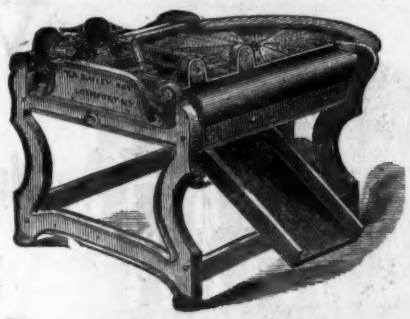

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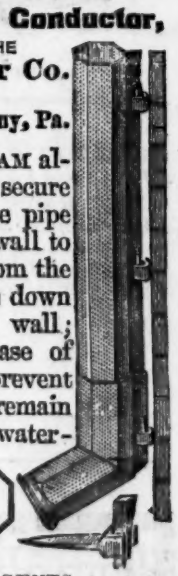

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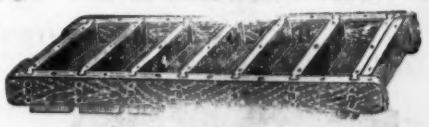

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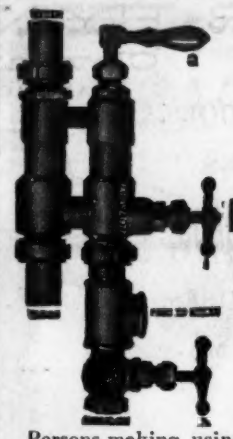

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INJECTOR PERFECTED,

IT IS THE

BEST BOILER FEEDER KNOWN,

And more of them have been sold during the past year than all Injectors in the market combined.

Thirty Days Trial to Responsible Parties.

Persons making, using, or dealing in Duplex Injectors, or Double Injectors, are hereby notified that all such Injectors in which a lifting jet apparatus raises or supplies water continuously to a forcing jet apparatus, are claimed, by the HANCOCK INSPIRATOR COMPANY, to infringe one or more patents owned by it.

On the 23d of June a suit in chancery was commenced by it against James Jenks, of Detroit, Mich., for making and selling the "Duplex Injector," so-called. Other infringers will be promptly sued.

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THE HANCOCK INSPIRATOR CO.
H. M. WHITNEY, President, Boston, Mass.
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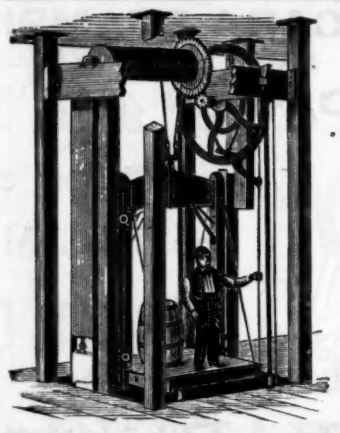

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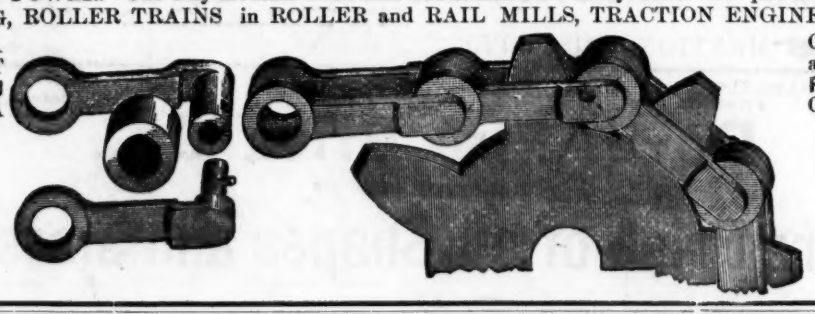

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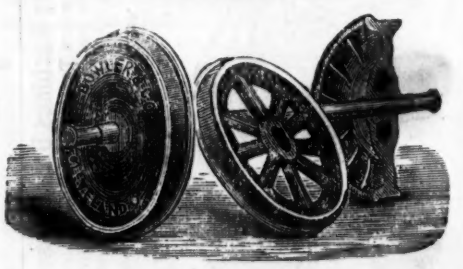

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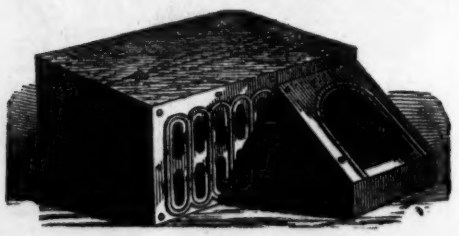
52,932 Mouse Traps Sold in October, 1881.



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ON THE MARKET.

"The mouse goes in to get the bait
And shuts the door by his own weight,
And then he jumps right through a hole
And thinks he's out; but bless his soul
He's in a cage, some how or other,
And sets the trap to catch another."

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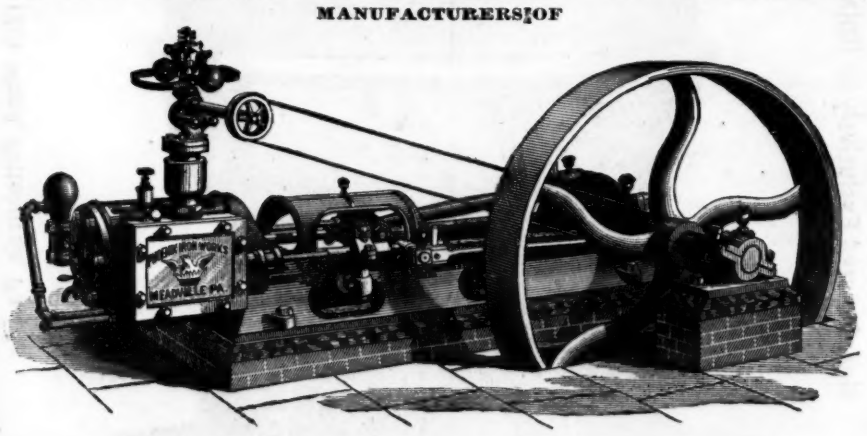

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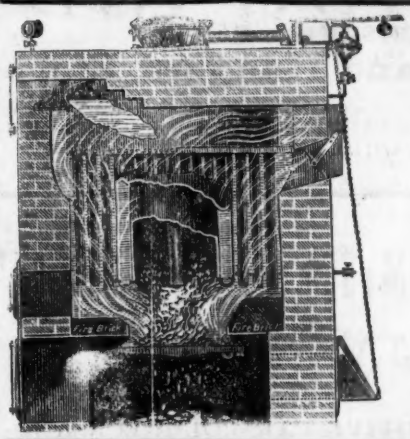

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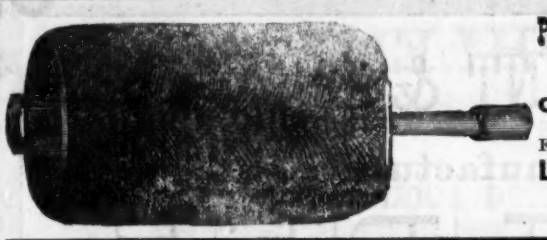

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